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Accuracy and Reliability of CEMS at Subpart Da (Electric Utilities) Facilities

Entropy Environmentalists, Inc., Research Triangle Park, NC

Prepared for:

Environmental Protection Agency, Research Triangle Park, NC

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16. ABSTRACT

EPA promulgated minimum quality assurance (QA) requirements for Continuous Emission Monitoring Systems (CEMS) in 40 CFR Part 60 Appendix F. Appendix F requires Da source owners to develop site-specific QA plans and report the results of EPA specified QA activities each calendar quarter. The first calendar quarter for which a report was to be submitted is January through March 1988.

The report of QA activities under Appendix F is called a Data Assessment Report (DAR). The DAR includes identifying and descriptive information for the CEMS, results of periodic audits, identification of periods when calibration drift exceeds specific criteria, identification of periods when the analyzers or CEMS are out of control (OOC), and descriptions of corrective actions in response to OOC conditions. An OOC period occurs when an analyzer or a CEMS fails to meet criteria specified in Appendix F. The criteria are expressed in terms of CEMS relative accuracy, analyzer accuracy, and analyzer drift.

The principle objective of this study is an evaluation of the information in DARs for six quarters from January 1988 through June 1989. Secondary study objectives include (1) the establishment of contacts with agency staff who normally receive the DARs each quarter and (2) identification of facilities for which DARs were apparently not received, for follow-up by the appropriate agency.

17. KEY WORDS AND DOCUMENT ANALYSIS

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EXECUTIVE SUMMARY

In January, 1989, a report was written which summarized information provided in Data Assessment Reports for the first two quarters of calendar year (CY) 1988. This is a follow-up to the initial report and includes a summary of CY 1988 and the first two quarters of CY 1989.

Data Assessment Reports are submitted to enforcement agencies by owners or operators of Subpart Da Electric Steam Generating units in response to the requirements of 40 CFR Part 60 Appendix F. Appendix F establishes minimum quality assurance requirements for continuous emission monitoring systems (CEMS's) when used as the New Source Performance Standard (NSPS) performance test method. The first quarterly report under Appendix F was to be submitted in March 1988.

Forty Subpart Da facilities owned or operated by 30 companies were identified through contacts with personnel in Federal, State, and local control agencies. Although an attempt was made to compile Data Assessment Reports from all forty facilities, reports were not obtained for all quarters. Primary reasons for not obtaining reports for all quarters are an apparent failure to communicate the request to agency contacts and, in some cases, a failure to establish a viable contact person. Based on the reports obtained by Entropy, the following conclusions are drawn:

1. Continuous emission monitoring systems on Subpart Da facilities routinely achieve the quarterly audit and daily drift criteria for acceptable performance.

2. The monitoring systems produce quality-assured data over 95 percent of the time.

3. Some owners/operators report relative accuracy results in concentration units, not in units of the standard.

4. Out-of-Control (OOC) periods are reported frequently as a result of excessive drift. In many cases, however, the duration of the OOC period was reported as less than one day, which is inconsistent with the definitions in Appendix F.

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....iii

1. BACKGROUND 1

2. STUDY OBJECTIVES AND PURPOSE OF REPORT.....2

3. OVERVIEW OF INFORMATION OBTAINED.....2

3.1 Sources.....2
3.2 Contact Persons.....4
3.3 Quarterly Audit Information.....4
3.4 CEMS Manufacturers.....4

4. RELATIVE ACCURACY TEST AUDITS.....6

4.1 General Information.....6
4.2 Relative Accuracy of SO_2 CEMS's.....6
4.3 Relative Accuracy of NO_x CEMS's.....9
4.4 RATA Results for Diluent Monitors.....9
4.5 Relative Accuracy and Monitor Manufacturers.....9
4.6 Conclusions on Relative Accuracy Test Audit Results.....9

5. CYLINDER GAS AUDITS.....16

5.1 General Information.....16
5.2 Distribution of CGA Accuracy Values.....16
5.3 CGA Accuracy and Monitor Manufacturers.....16
5.4 Conclusions on Cylinder Gas Audits.....16

6. RELATIVE ACCURACY AUDITS.....24

7. CALIBRATION DRIFT ASSESSMENT.....24

7.1 General Information.....24
7.2 Duration of OOC Periods Due to Excessive CD.....24
7.3 Corrective Actions for Excessive Calibration Drift.....26
7.4 Conclusions on Calibration Drift Assessment.....26

8. FORMAT OF THE DATA ASSESSMENT REPORTS.....26

Appendix A. Monitor Manufacturer Information

Appendix B. RATA Data

Appendix C. CGA Data

Appendix D. RAA Data

1. BACKGROUND

The U. S. Environmental Protection Agency (EPA) promulgated a New Source Performance Standard (NSPS) for Electric Utility Steam Generating Units under 40 CFR Part 60 Subpart Da in December 1978. Subpart Da applies to units for which construction was commenced after September 18, 1978. For convenience, the term "Da" is used in this report as a short-hand for "Subpart Da."

The Da emission standards for sulfur dioxide (SO_2) and nitrogen oxides (NO_x) are based on an average emission rate for 30 consecutive boiler operating days; a new 30-day performance test is completed at the end of each boiler operating day. A day is defined as a 24-hour period from midnight to midnight. A boiler operating day is defined as a day during which fuel is burned for the entire 24 hours. The NSPS requires the use of continuous emission monitoring system (CEMS's) as the performance test method.

EPA promulgated minimum quality assurance (QA) requirements to be implemented by the source owner when the CEMS is specified as the performance test method. The QA requirements were published in 40 CFR Part 60 Appendix F and became effective in December 1987. Appendix F requires Da source owners to develop site-specific QA plans and to report the results of EPA specified QA activities each calendar quarter. The first calendar quarter for which a report was to be submitted is January through March 1988.

QA activities reported under Appendix F comprise a Data Assessment Report (DAR). The DAR includes identifying and descriptive information of the CEMS's, results of periodic audits, identification of periods when calibration drift exceeds specified criteria, identification of periods when the analyzers or CEMS's are out-of-control (OOC), and descriptions of corrective actions in response to OOC conditions. An OOC period occurs when an analyzer or a CEMS fails to meet criteria specified in Appendix F. Criteria are expressed in terms of CEMS relative accuracy, analyzer accuracy, and analyzer drift.

Data generated by a CEMS after it is found to be OOC cannot be used to meet the minimum number of measurements required in Da to calculate 30-day averages. When minimum data needs are not met by the CEMS, supplemental sampling is required.

Appendix F requires an audit of each CEMS every calendar quarter. Audit results are summarized in Sections 4, 5, and 6. These audits are:

- Relative Accuracy Test Audit (RATA),
- Cylinder Gas Audit (CGA), and
- Relative Accuracy Audit (RAA).

The NSPS General Provisions (Subpart A) and Appendix F require a daily assessment of drift. In Appendix F the daily check is called a Calibration Drift Assessment (CDA). Information relating to CDA is discussed in Section 7.

2. STUDY OBJECTIVES AND PURPOSE OF REPORT

The principle objective of this study is to evaluate the information in DAR's for calendar year 1988 and the first two quarters of calendar year 1989. Results of this evaluation will provide:

- A basis for planning revisions or modifications to Appendix F.
- Comparative statistics for use by enforcement agencies in evaluating the performance of specific CEMS's.
- A data base for judging trends in CEMS performance with time.

3. OVERVIEW OF INFORMATION OBTAINED

3.1 SOURCES

Forty facilities owned or operated by 30 companies were identified as Da units (see Table 1). For convenience, each unit is assigned an identifying code number. The first numerical character in the code identifies the EPA Regional Office responsible for enforcement of the NSPS; the second and third characters are standard two-letter abbreviations for the state in which the source is located. The number following the state abbreviation consists of two parts: a consecutive number for each Da unit owned or operated by a different company in the EPA Region, which precedes the decimal, and a consecutive number after the decimal, for each Da facility owned or operated by the same company in the state.

3.2 CONTACT PERSONS

Several contact persons along with their corresponding agencies and phone numbers are available to supply further information on Data Assessment Reports (see Table 2). Agency affiliations include EPA Regional Offices, State agency headquarters, State agency district offices, and county agencies.

3.3 QUARTERLY AUDIT INFORMATION

Table 3 provides a summary of the type of audits reported in the DAR's obtained for this study. Blank spaces indicate that a DAR was not received, but do not imply that a report was not submitted to the proper agency by the source owner or operator. In many cases, reports were apparently not obtained because the correct contact person was not found or the need for the information was not properly communicated. Within the table, a double asterisk identifies quarters in which an out-of-control period was reported. Detailed information on the audits is provided in the appendices.

3.4 CEMS MANUFACTURERS

A list of manufacturers, analyzer model numbers, CEMS type, and analyzer serial numbers is provided in Appendix A. The information in Appendix A is based on information reported in the DAR's, but has been supplemented by staff at Entropy Environmentalists, Inc. and plant environmental engineers.

TABLE 1.

SUBPART Da SOURCES

Region	Unit Code	Utility Name	Facility
2	2NY01.1	NY State Electric & Gas	Somerset #1
3	3PA01.1	Westwood Energy Properties	Joliett
4	4FL01.1	Jacksonville Electric Authority	Power Park #1
	4FL02.1	Orlando Utility Commission	Stanton #1
	4FL03.1	Seminole Electric Cooperative	Palatka #1
	4FL03.2	Seminole Electric Cooperative	Palatka #2
	4FL04.1	Tampa Electric Company	Big Bend #4
	4KY05.1	Big Rivers Electric Cooperative	DB Wilson #1
	4SC06.1	SC Public Service Authority	Cross #2
5	5IN01.1	Northern Indiana Public Service	Schahfer #17
	5IN01.2	Northern Indiana Public Service	Schahfer #18
	5IN02.1	Southern Indiana Gas & Electric Co.	AB Brown #2
	5IN02.2	Southern Indiana Gas & Electric Co.	AB Brown #1
	5MI03.1	Grand Haven Board of Light & Power	JB Sims #3
	5MI04.1	Michigan South Central Power	Mich Proj #1
	5MI05.1	Marquette Board of Light & Power	Shiras #3
	5MN06.1	Northern States Power	Sherco #3
6	6NM01.1	Plains Electric Gene. & Trans.	Plains #1
	6OK02.1	Grand River Dam Authority	GRDA #2
	6TX03.1	Houston Lighting & Power Company	Limestone #1
	6TX03.2	Houston Lighting & Power Company	Limestone #2
	6TX03.3	Houston Lighting & Power Company	WA Parrish #8
	6TX04.1	West Texas Utilities Company	Oklaunion #1
7	7IA01.1	Muscatine Power & Water	Muscatine #9
	7KS02.1	Sunflower Electric Cooperative	Holcomb #1
8	8CO01.1	Colorado Ute Electric Association	Craig #3
	8CO01.2	Colorado Ute Electric Association	Nucla
	8CO02.1	Platte River Electric Authority	Rawhide #1
	8ND03.1	United Power Association	Stanton #10
	8UT04.1	Deseret Generation & Transmission Coop	Bonanza #1
	8UT05.1	Intermountain Power Service Corporation	IGS #1
	8UT05.2	Intermountain Power Service Corporation	IGS #2
	8UT06.1	Utah Power & Light Company	Hunter #3
9	9CA01.1	Stockton Cogeneration	Stockton
	9CA02.1	Luz Engineering Corporation	SEGS II
	9CA02.2	Luz Engineering Corporation	SEGS III
	9CA02.3	Luz Engineering Corporation	SEGS IV
	9CA02.4	Luz Engineering Corporation	SEGS V
	9NV03.1	Nevada Power Company	R Gardner #4
	9NV04.1	Sierra Pacific Power Company	North Valmy#2

TABLE 2.

AGENCY CONTACT PERSONS

Region	Unit Code	Contact Person	Agency	Phone
2	2NY01.1	Ann Zownir	EPA RO 2	(201)321-6699
3	3PA01.1	Scott Darling	EPA RO 3	(717)783-9723
4	4FL01.1	Mort Benjamin	State DO	(904)798-4200
	4FL02.1	Dennis Nestor	County	(407)244-7400
	4FL03.1	Mort Benjamin	State DO	(904)798-4200
	4FL03.2	Mort Benjamin	State DO	(904)798-4200
	4FL04.1	William Schroeder	State DO	(813)272-5530
	4KY05.1	Steve Hagedorn	State Hdq.	(502)564-3382
	4SC06.1	Jake Frick	State Hdq.	(803)734-4750
5	5IN01.1	Rod Thompson	State Hdq.	(317)243-5125
	5IN01.2	Rod Thompson	State Hdq.	(317)243-5125
	5IN02.1	Rod Thompson	State Hdq.	(317)243-5125
	5IN02.2	Rod Thompson	State Hdq.	(317)243-5125
	5MI03.1	Joe Holms	State DO	(906)228-6561
	5MI04.1	Patric McCoy	EPA RA #5	(616)456-5071
	5MI05.1	Don Stephens	State DO	(312)886-6869
	5MN06.1	Lori Bartel	State Hdq.	(612)296-7599
6	6NM01.1	Stanley Spruiell	EPA RO #6	(214)655-7229
	6OK02.1	Stanley Spruiell	EPA RO #6	(214)655-7229
	6TX03.1	Stanley Spruiell	EPA RO #6	(214)655-7229
	6TX03.2	Stanley Spruiell	EPA RO #6	(214)655-7229
	6TX03.3	Stanley Spruiell	EPA RO #6	(214)655-7229
	6TX04.1	Stanley Spruiell	EPA RO #6	(214)655-7229
7	7IA01.1	Dave Phelps	State Hdq.	(515)291-8189
	7KS02.1	Jon Knodel	EPA RO #7	(913)296-2896
8	8CO01.1	Robert Jorgenson	State Hdq.	(303)331-8580
	8CO01.2	Robert Jorgenson	State Hdq.	(303)331-8580
	8CO02.1	Robert Jorgenson	State Hdq.	(303)331-8580
	8ND03.1	Gary Helbling	State Hdq.	(701)224-2348
	8UT04.1	Norm Erickson	State Hdq.	(801)538-6108
	8UT05.1	Norm Erickson	State Hdq.	(801)538-6108
	8UT05.2	Norm Erickson	State Hdq.	(801)538-6108
	8UT06.1	Norm Erickson	State Hdq.	(801)538-6108
9	9CA01.1	Steve Frey	EPA RO #9	(415)974-7648
	9CA02.1	Steve Frey	EPA RO #9	(415)974-7648
	9CA02.2	Steve Frey	EPA RO #9	(415)974-7648
	9CA02.3	Steve Frey	EPA RO #9	(415)974-7648
	9CA02.4	Steve Frey	EPA RO #9	(415)974-7648
	9NV03.1	Tom Porta	State Hdq.	(702)885-5065
	9NV04.1	Tom Porta	State Hdq.	(702)885-5065

TABLE 3.

SUMMARY OF DATA ASSESSMENT REPORTS

	1988				1989		
Unit Code	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3
2NY01.1	RATA	CGA	CGA	CGA	CGA	RATA	
3PA01.1			CGA	CGA	CGA	CGA	
4FL01.1	RATA**	CGA**					
4FL02.1							
4FL03.1	RATA**	CGA					
4FL03.2	RATA**	CGA**					
4FL04.1	RATA**	CGA	CGA	CGA	RATA		
4KY05.1	RATA				RATA		
4SC06.1	RATA	CGA	CGA	CGA	RAA/CGA		
5IN01.1	CGA		CGA	CGA	CGA	RATA	
5IN01.2		CGA	CGA	CGA	CGA		
5IN02.1	RATA	CGA	CGA	CGA	RATA	CGA	
5IN02.2		RATA			CGA		
5MI03.1		RATA		CGA		RATA	
5MI04.1	RATA**	RATA					
5MI05.1						CGA	
5MN06.1	CGA	CGA	RATA	CGA			
6NM01.1		RATA**	CGA**	CGA**	CGA**		
6OK02.1	RATA	RATA**	RATA	RATA	RATA	RATA	
6TX03.1	RATA**	CGA	CGA	RATA	CGA**	CGA**	
6TX03.2	RATA**	CGA	CGA	RATA	CGA**	CGA**	
6TX03.3	RATA	CGA	CGA	RATA	CGA	CGA	
6TX04.1	RATA**	RATA		CGA	CGA	RATA	
7IA01.1	RATA/CGA**		CGA**	CGA**	CGA**	RATA**	
7KS02.1	RATA	CGA**	CGA**	RATA	CGA**		
8CO01.1	RATA	CGA	RATA	CGA	CGA**		
8CO01.2			CGA**		CGA**		
8CO02.1	RATA/CGA	CGA	CGA	CGA	CGA		
8ND03.1	RATA	CGA**	**	CGA**	CGA**		
8UT04.1	CGA	RATA	CGA	CGA	CGA		
8UT05.1		RATA	CGA	CGA	CGA		
8UT05.2	CGA	RATA	CGA	CGA	CGA		
8UT06.1			RATA				
9CA01.1					CGA		CGA
9CA02.1							
9CA02.2							
9CA02.3							
9CA02.4							
9NV03.1	RATA**	RATA	CGA	CGA	CGA**		
9NV04.1	RATA	CGA**	CGA**	RATA	RATA/CGA**		

**Reported Out of Control Period due to Audit Failure/Calibration Drift

4. RELATIVE ACCURACY TEST AUDITS

4.1 GENERAL INFORMATION

Appendix F requires a minimum of one Relative Accuracy Test Audit (RATA) for each Da facility every calendar year. RATA's were to be performed in the first quarter of 1988 for units in operation on the effective date of Appendix F. A RATA is patterned after the Performance Specification Test (PST) required for each CEMS at the time of installation, consisting of a comparison of CEMS response with at least nine measurements using EPA test methods. The result of the RATA is the CEMS Relative Accuracy (RA). Expressed as a percentage of the mean of the test method measurements, this consists of two components: the absolute difference between the CEMS response and test method measurements; and a confidence coefficient. All data are to be in units of the applicable standard.

Data on RATA's are tabulated by pollutant and facility in Appendix B. The table in Appendix B includes a column called "Recalculated Relative Accurcy" This column is a listing of RA values recalculated for this report from the basic parameters reported in the DAR's.

A comparison of the recalculated values with the reported values indicates that there is a significant number of errors in the reported values. It is possible that there are inconsistencies or errors in the calculations of other reported data, such as the standard deviations or confidence coefficients. This cannot be checked, however, since Procedure 1 does not require the source owner to report all measured results. Inconsistencies may also be due to the possibility that some of the accuracy results were based on the reference method and others were based on the standard.

The table in Appendix B also displays several cases where data are reported in concentration units instead of units of the standard, and several cases where values for the test method and CEMS means are not reported.

A distribution of the CEMS's recalculated RA results for all audits is shown in Figure 1. In Figure 1, each bar represents an increment of five percent RA; for example, the bar on the left indicates that 28 percent of the RA values were in the range of 0 to 5 percent. The total number of audits is 187, as shown in the title for the vertical scale. The data indicate that about 93 percent of the recalculated audit results met the 20 percent criterion for acceptable performance.

4.2 RELATIVE ACCURACY OF SO_2 CEMS's

A distribution of the recalculated RA audit results for the SO_2 CEMS's is shown in Figure 2. The data used to develop Figure 2 are the recalculated RA's from Appendix B. RA's based on concentration measurements are not included. With three exceptions, the RA's are less than 20 percent.

For two of the cases that exceeded 20 percent, the CEMS's were retested with satisfactory results after adjustments, repairs, and recalibrations. In the third case, the facility was taken off-stream for repairs and no follow-up data have been obtained. Two DAR's listed an out-of-control period as a result of a RATA (5MI04.1 and 6TX04.1).

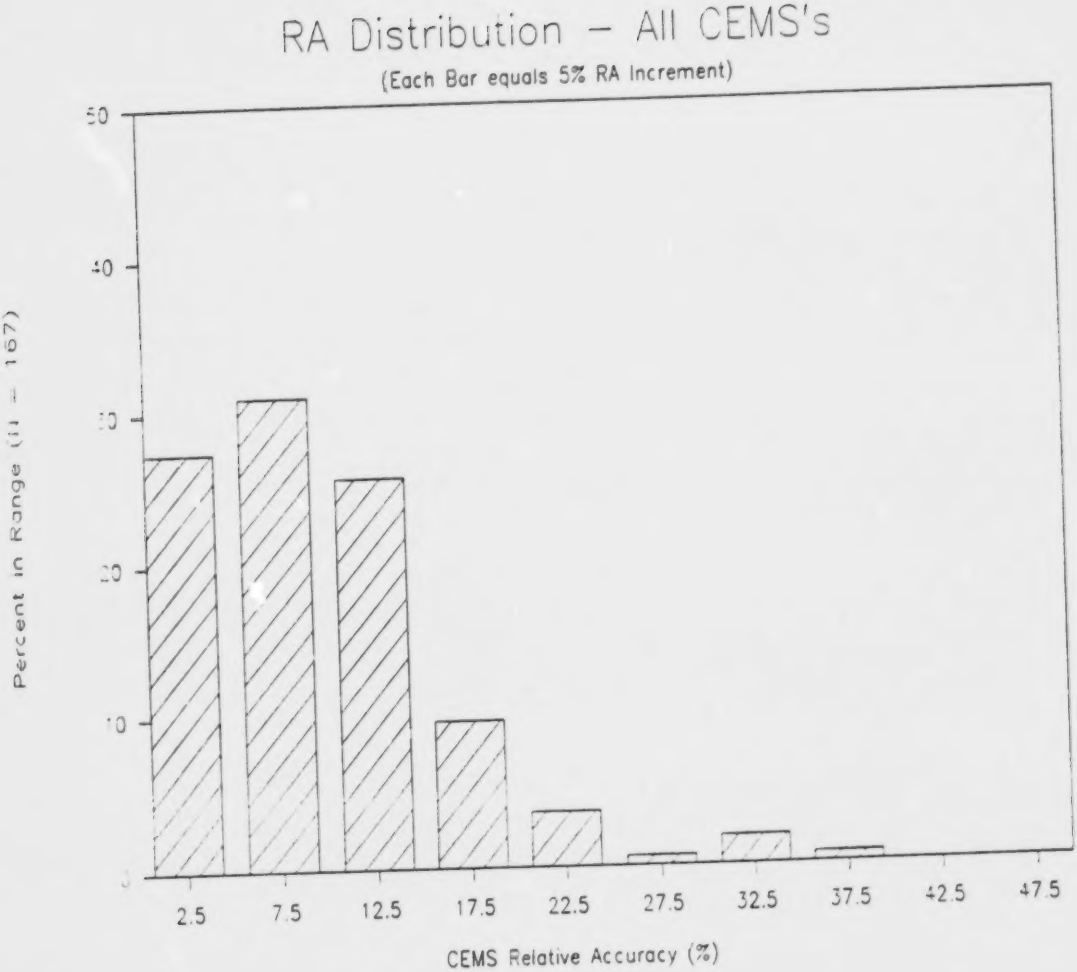

RA Distribution – All CEMS's
(Each Bar equals 5% RA Increment)
Percent in Range (N = 167)
50
40
30
20
10
0
2.5
7.5
12.5
17.5
22.5
27.5
32.5
37.5
42.5
47.5
CEMS Relative Accuracy (%)

Figure 1

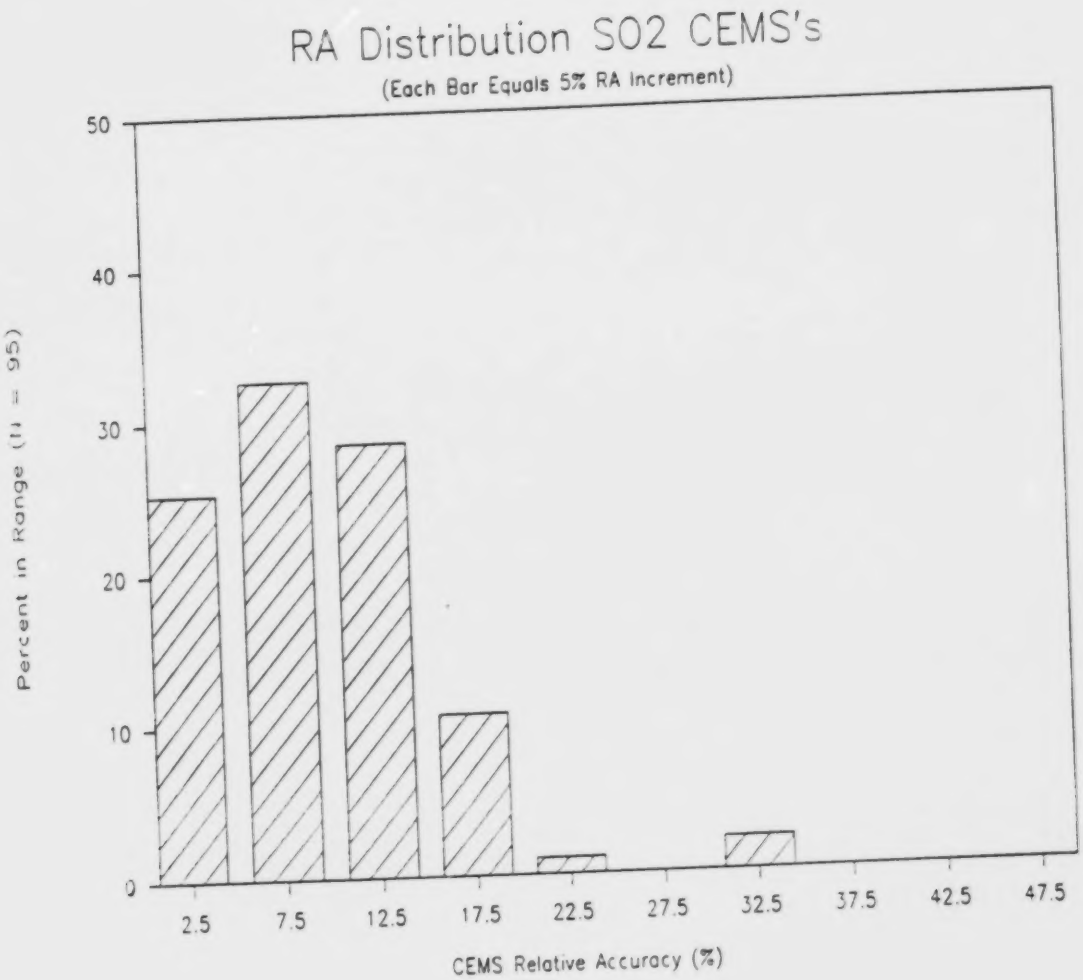

RA Distribution SO2 CEMS's
(Each Bar Equals 5% RA Increment)
Percent in Range (N = 95)
50
40
30
20
10
0
2.5
7.5
12.5
17.5
22.5
27.5
32.5
37.5
42.5
47.5
CEMS Relative Accuracy (%)

Figure 2

Figure 3 shows a distribution of recalculated RA values for Test Method (TM) means less than and greater than 2 pounds per million Btu (lb/MMBtu), respectively. The data were sorted above and below 2 lb/MMBtu because of a natural gap in emission rates. There are more data points for the distribution of the higher emission rates because it includes facilities with CEMS's at the inlets to two control devices at the same facility.

Of importance in Figure 3 is the smaller percentage of lower RA values for the lower emission rates. This may reflect an increased difficulty in making accurate measurements with either the TM or CEMS at low emission rates.

4.3 RELATIVE ACCURACY OF NO_x CEMS's

Figure 4 shows a distribution of recalculated RA values for NO_x CEMS's. As with the SO_2 data, RA's based on concentration values are not included. For seven CEMS's, the RA's exceeded 20 percent.

Out of the seven CEMS's that exceeded 20 percent, there were several CEMS's that reported contradictory data. The CEMS at one facility was retested and a value of 19.6 percent was reported. Recalculation of the data gave a result of 21.1 percent. At another unit, a follow-up RATA in the next quarter resulted in an RA of 2.8 percent. At a third unit, the reported RA was 16.6 percent, but the value was recalculated to be 23.5 percent.

4.4 RATA RESULTS FOR DILUENT MONITORS

Although Appendix F does not require RATA's be performed on diluent monitors, several DAR's included such information. Distributions of the recalculated results for O_2 and CO_2 are shown in Figures 5 and 6, respectively.

4.5 RELATIVE ACCURACY AND MONITOR MANUFACTURERS

Figures 7 and 8 show minimum, average, and maximum recalculated audit results by monitor manufacturer for SO_2 and NO_x respectively. The values are arranged in ascending order by the average RA values. The data seem to suggest some differences in performance and might be useful in the design of future studies. Further interpretation of the data is not warranted because of the potential influence of other factors on audit results and the small number of audits for some specific vendors.

4.6 CONCLUSIONS ON RELATIVE ACCURACY TEST AUDIT RESULTS

a. Appendix F criterion of 20 percent RA for acceptable performance has been achieved for about 93 percent of the audits.

b. The criterion is apparently easier to achieve for higher emission rates.

c. A significant number of reports included RA values that were in error as evidenced by a simple recalculation of reported data.

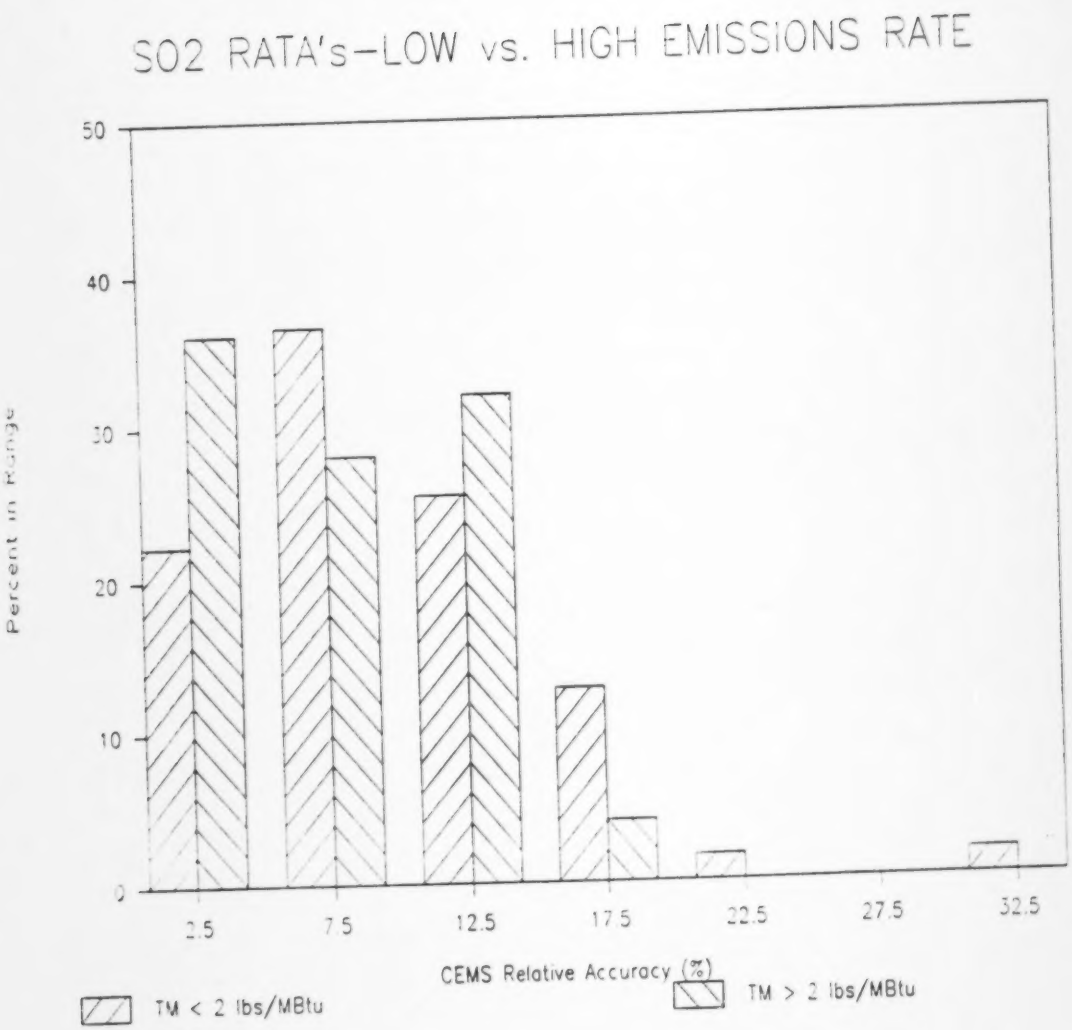

SO2 RATA's–LOW vs. HIGH EMISSIONS RATE
50
40
30
20
10
0
Percent in Range
2.5
7.5
12.5
17.5
22.5
27.5
32.5
CEMS Relative Accuracy (%)
TM < 2 lbs/MBtu
TM > 2 lbs/MBtu

Figure 3

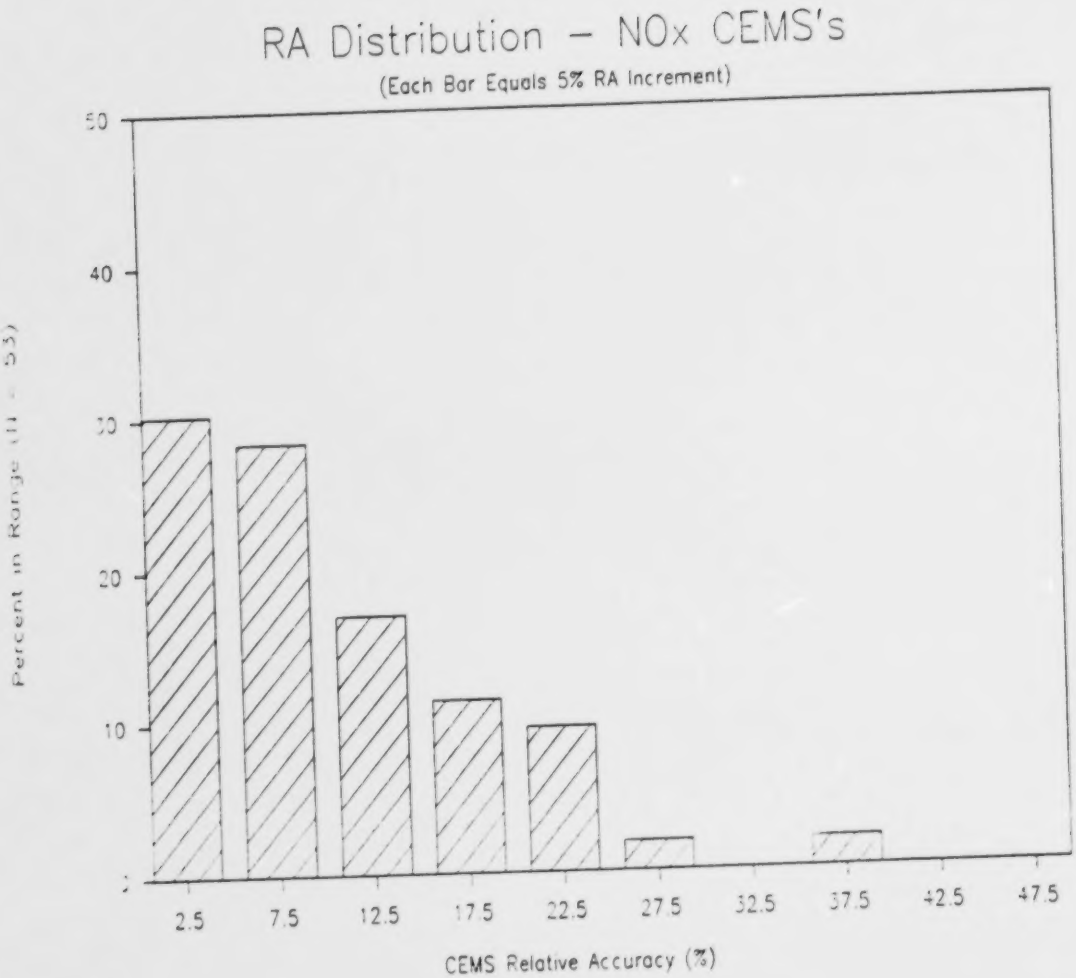

RA Distribution – NOx CEMS's
(Each Bar Equals 5% RA Increment)
50
40
30
20
10
2.5
7.5
12.5
17.5
22.5
27.5
32.5
37.5
42.5
47.5
CEMS Relative Accuracy (%)

Figure 4

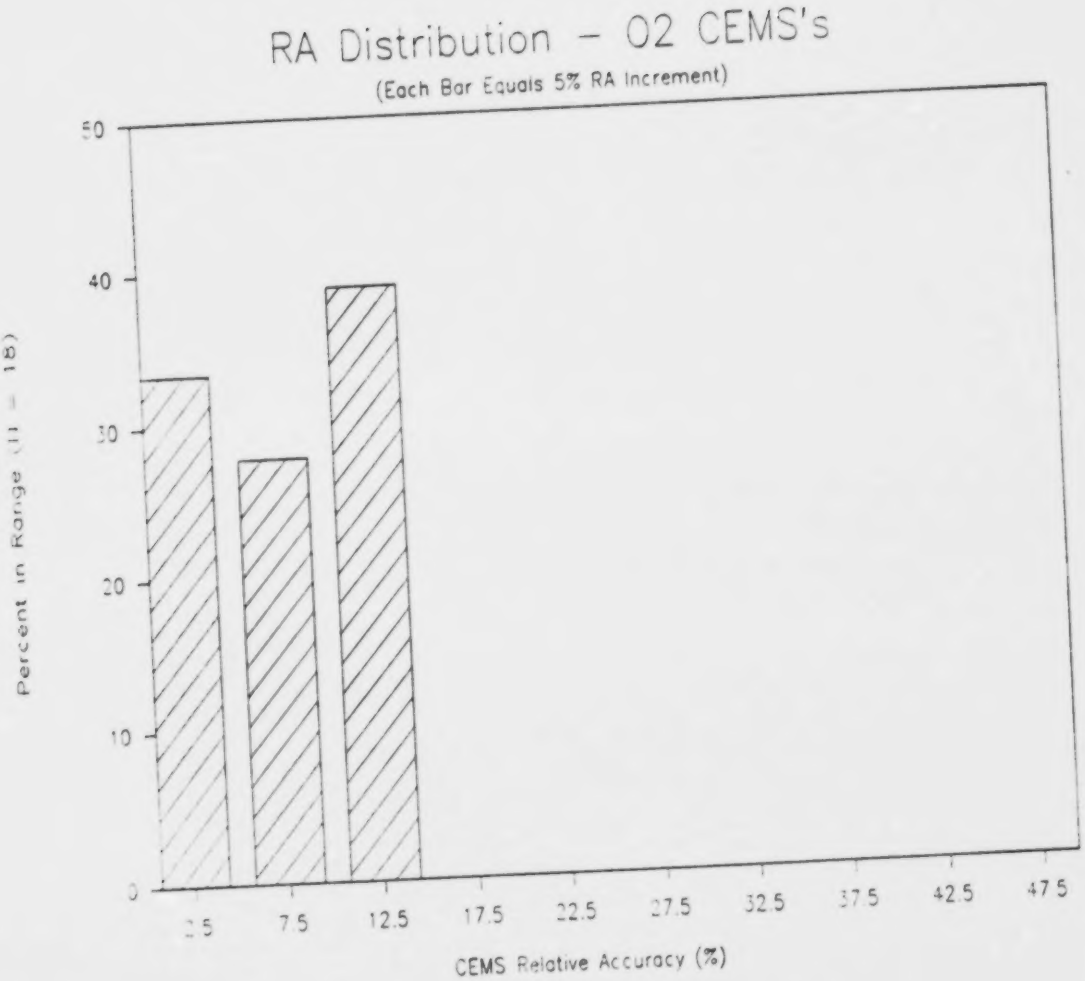

RA Distribution – O2 CEMS's
(Each Bar Equals 5% RA Increment)
Percent in Range (1 – 18)
50
40
30
20
10
0
2.5
7.5
12.5
17.5
22.5
27.5
32.5
37.5
42.5
47.5
CEMS Relative Accuracy (%)

Figure 5

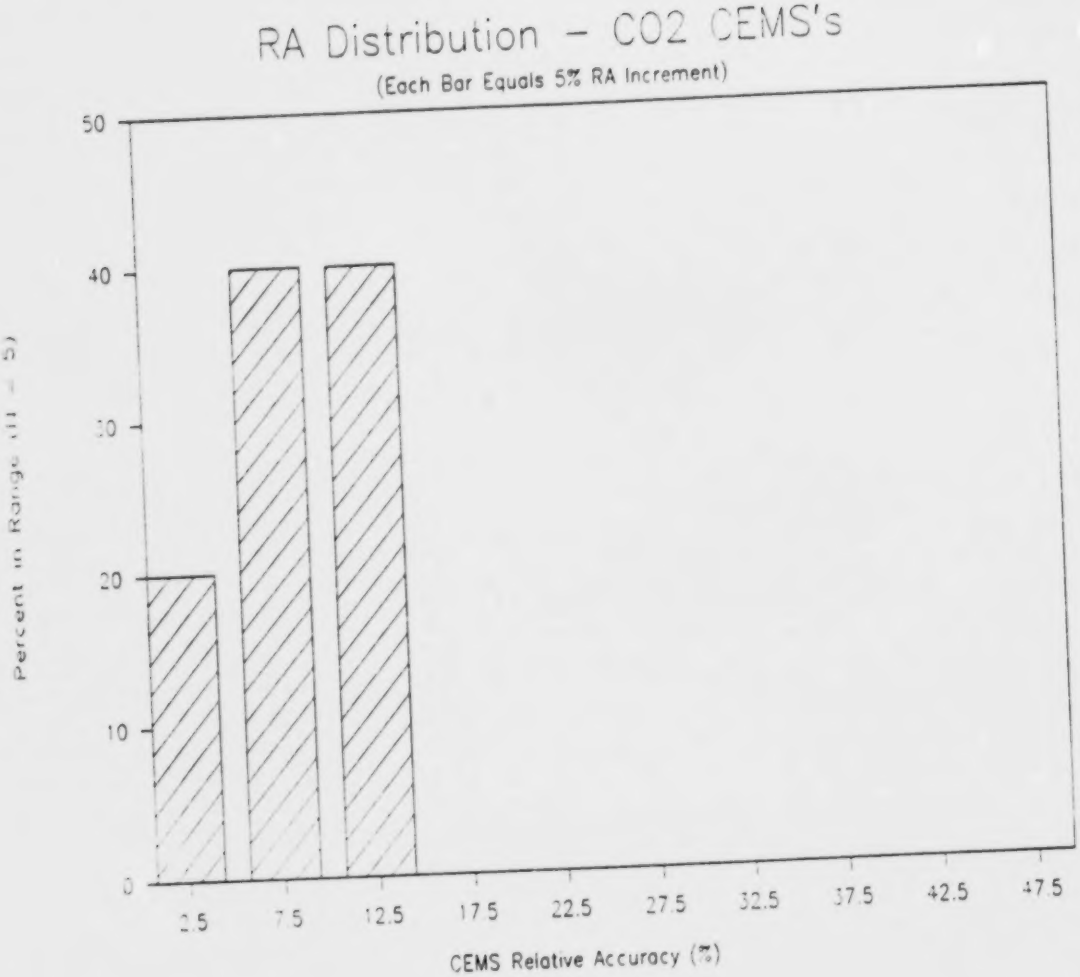
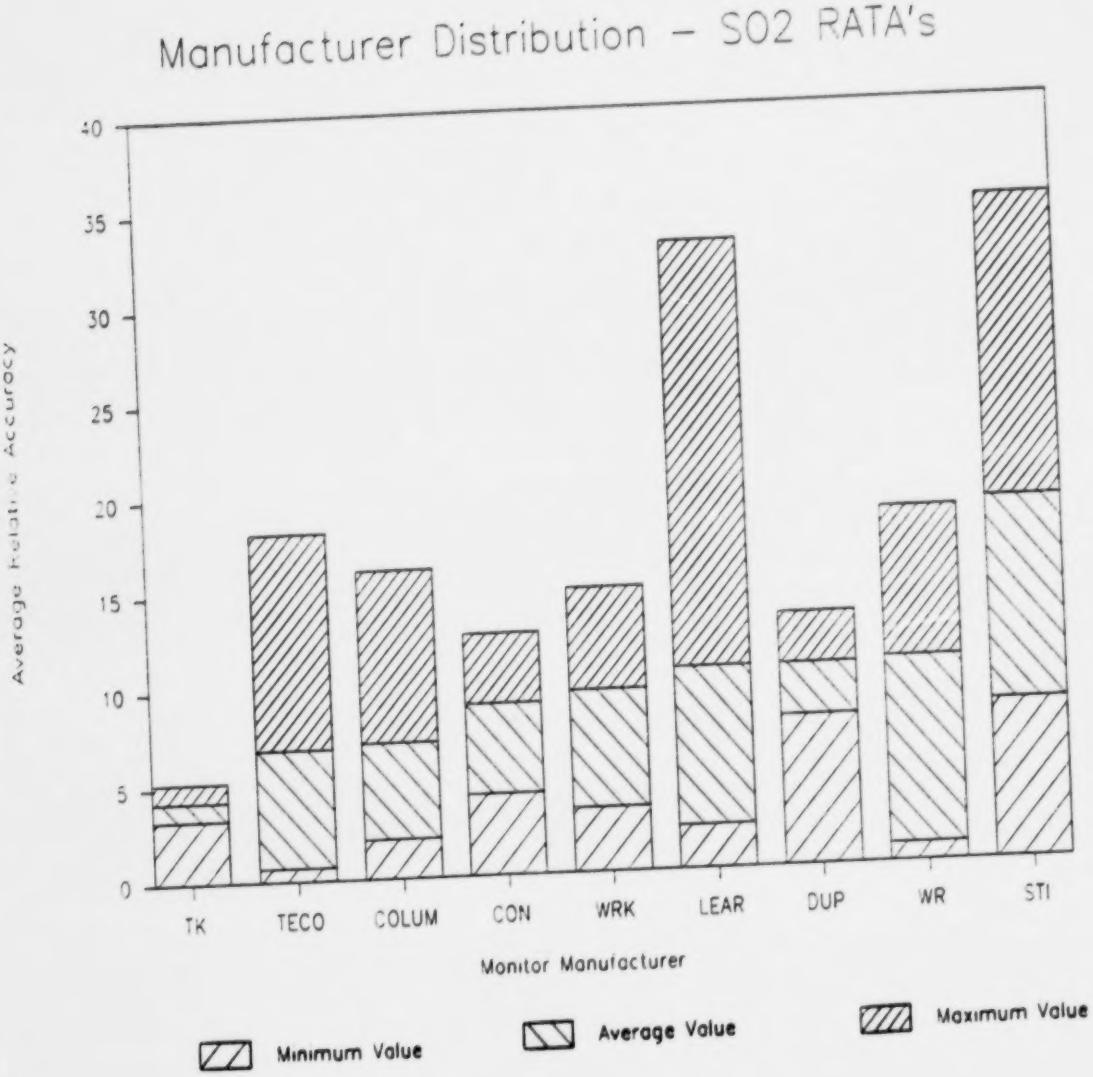

RA Distribution – CO2 CEMS's
(Each Bar Equals 5% RA Increment)
Percent in Range (1 – 5)
50
40
30
20
10
0
2.5
7.5
12.5
17.5
22.5
27.5
32.5
37.5
42.5
47.5
CEMS Relative Accuracy (%)

Figure 6

Figure 7



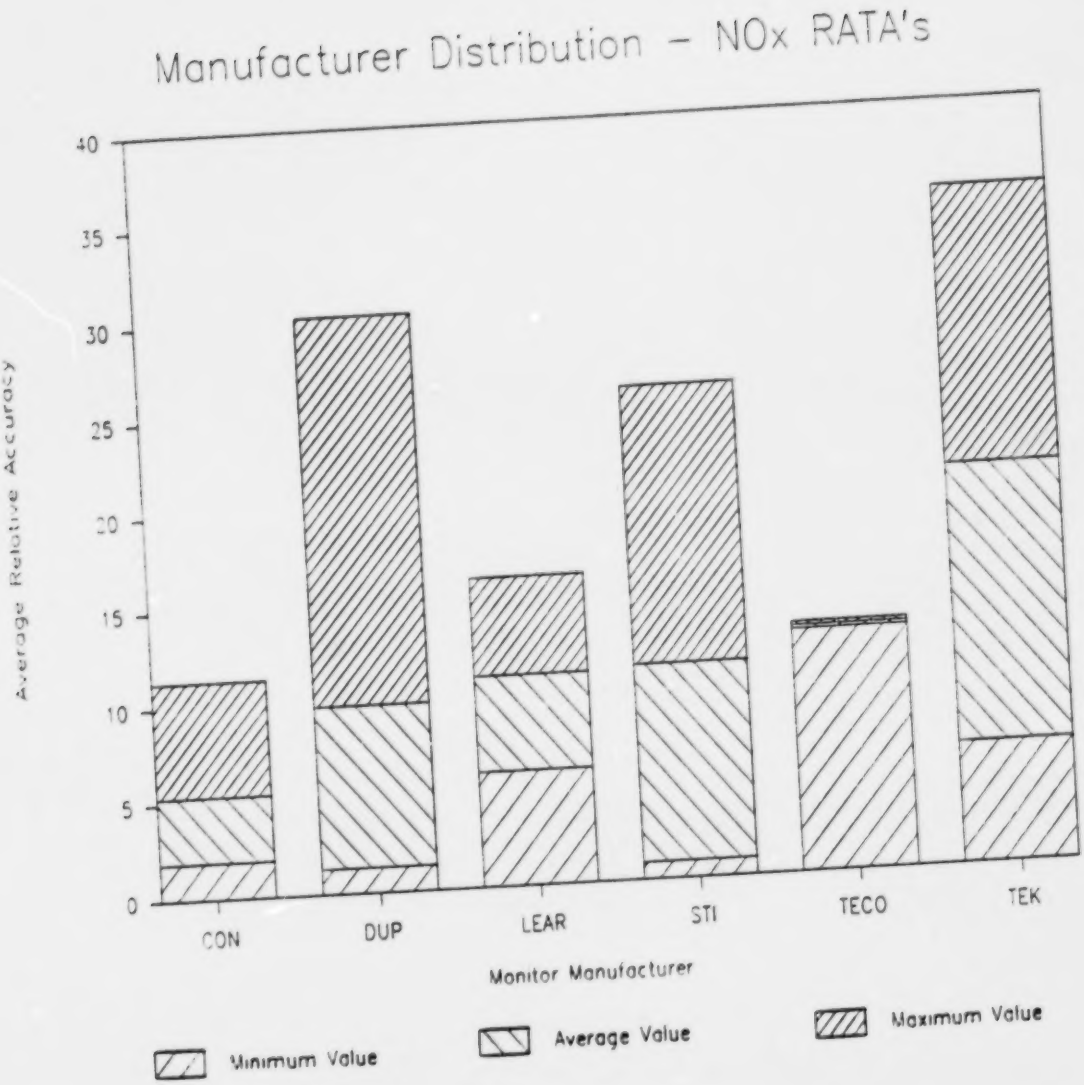
ACS - Automated Custom Systems
CON - Contraves Goerz
HORIB - Horiba
STI - Sampling Technology
TCE - Thermo Environmental - (XVB)
TK - Thermox - (XVB)
WR - Western Research
NR - Not Reported

COLUM - Columbia Scientific
DUP - Dupont
LEAR - Lear Siegler
TECO - Thermo Environmental Co.
THERM - Thermox
WEST - Westinghouse
WRK - Western Research - (XVB)

SO_2 RATA Values

MONITOR	MINIMUM	AVERAGE	MAXIMUM
TK	3.86	4.38	5.34
TECO	0.70	6.90	18.18
COLUM	2.06	7.13	16.13
CON	4.26	9.96	13.67
WRK	3.38	9.88	14.99
LEAR	3.33	10.84	33.98
DUP	7.85	10.35	13.25
WR	0.99	10.75	19.87
STI	0.32	18.83	34.78

Figure 8



ACS - Automated Custom Systems
CON - Contraves Goerz
HORIB - Horiba
STI - Sampling Technology
TEK - Thermo Environmental - (KVB)
TE - Thermox - (KVB)
WR - Western Research
NR - Not Reported

COLUM - Columbia Scientific
DUP - Dupont
LEAR - Lear Siegler
TECO - Thermo Environmental Co.
THERN - Thermox
WEST - Westinghouse
WRA - Western Research - (KVB)

NO_x RATA VALUES

MONITOR	MINIMUM	AVERAGE	MAXIMUM
TEK	1.89	9.33	11.29
LEAR	1.33	9.76	20.26
CON	5.99	10.96	16.16
TECO	0.89	11.19	25.83
DUP	12.63	12.98	12.97
STI	6.36	29.86	35.48

5. CYLINDER GAS AUDITS

5.1 GENERAL INFORMATION

Appendix F allows the source owner to perform three Cylinder Gas Audits (CGA's) each calendar year. A CGA checks the CEMS response to cylinder gases of known concentrations. Instrument response is compared to cylinder gas concentrations at two prescribed levels. The result is called CGA Accuracy and is expressed as a percent of the audit gas concentration. If the difference is greater than 15 percent the CEMS is defined as OOC. Data collected after the audit is done and before the inaccuracy is demonstrated to be corrected cannot be used to meet the minimum data requirements of Subpart Da.

Data on CGA's are listed in Appendix C. The columns labeled "CAL RA1" and "CAL RA2" show accuracy values for the two audit points that have been recalculated for this report. Values were recalculated to verify the reported values and to check positive and negative results. The reported and recalculated data (shown in Appendix C) indicate some calculation errors and, in some cases, a wrong interpretation of positive and negative results. In general, the reported and recalculated results are in close agreement. Only one source (8C001.2) reported an OOC period as a result of a CGA.

5.2 DISTRIBUTION OF CGA ACCURACY VALUES

Figure 9 shows the distribution of all Cylinder Gas Audit recalculated values for pollutant and diluent gases. Figures 10 through 13 show the distribution of recalculated CGA Accuracy values for SO_2, NO_x, CO_2, and O_2, respectively. Each bar equals an increment of 6 percent accuracy. For example, the bar plotted at 0 percent represents the fraction of CGA values between -3 and +3 percent. The number of data points used to generate each distribution (N) is shown on the vertical axis label of each figure. For all gases the values appear to be distributed normally around a central value of zero percent. The data for SO_2 and O_2 include several CGA Accuracy values in excess of the $\pm$ 15 percent criterion.

Figure 14 shows a distribution of CGA SO_2 recalculated Accuracy values for High and Low gas concentrations. At the high concentrations, deviation from zero percent accuracy seems to be lower than at the low concentrations. There are insufficient data to warrant further analysis of this possibility, although it is consistent with the RATA results.

5.3 CGA ACCURACY AND MONITOR MANUFACTURERS

Figure 15 shows a distribution of CGA recalculated accuracy values for each monitor manufacturer, using absolute values of the CGA results. Average, minimum and maximum values are shown, sorted in ascending order by the average values. The average values are very similar, ranging from two to four percent RA. It may be significant that the CEMS's with the two highest maximum RA's are Western Research systems.

5.4 CONCLUSIONS ON CYLINDER GAS AUDITS

The Appendix F criterion of $\pm$ 15 percent RA for acceptable performance was achieved in over 98 percent of the audits.

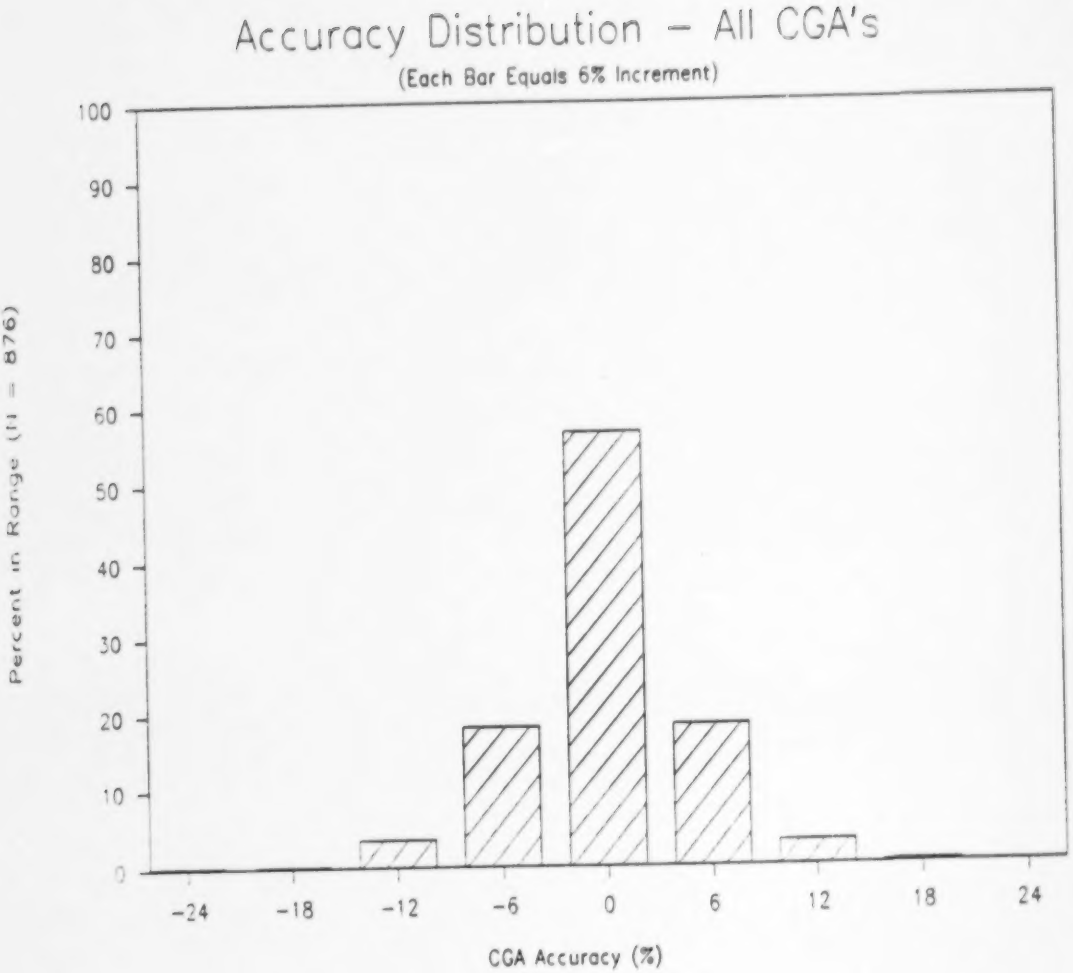

Accuracy Distribution – All CGA's
(Each Bar Equals 6% Increment)
Percent in Range (N = 876)
100
90
80
70
60
50
40
30
20
10
0
-24
-18
-12
-6
0
6
12
18
24
CGA Accuracy (%)

Figure 9

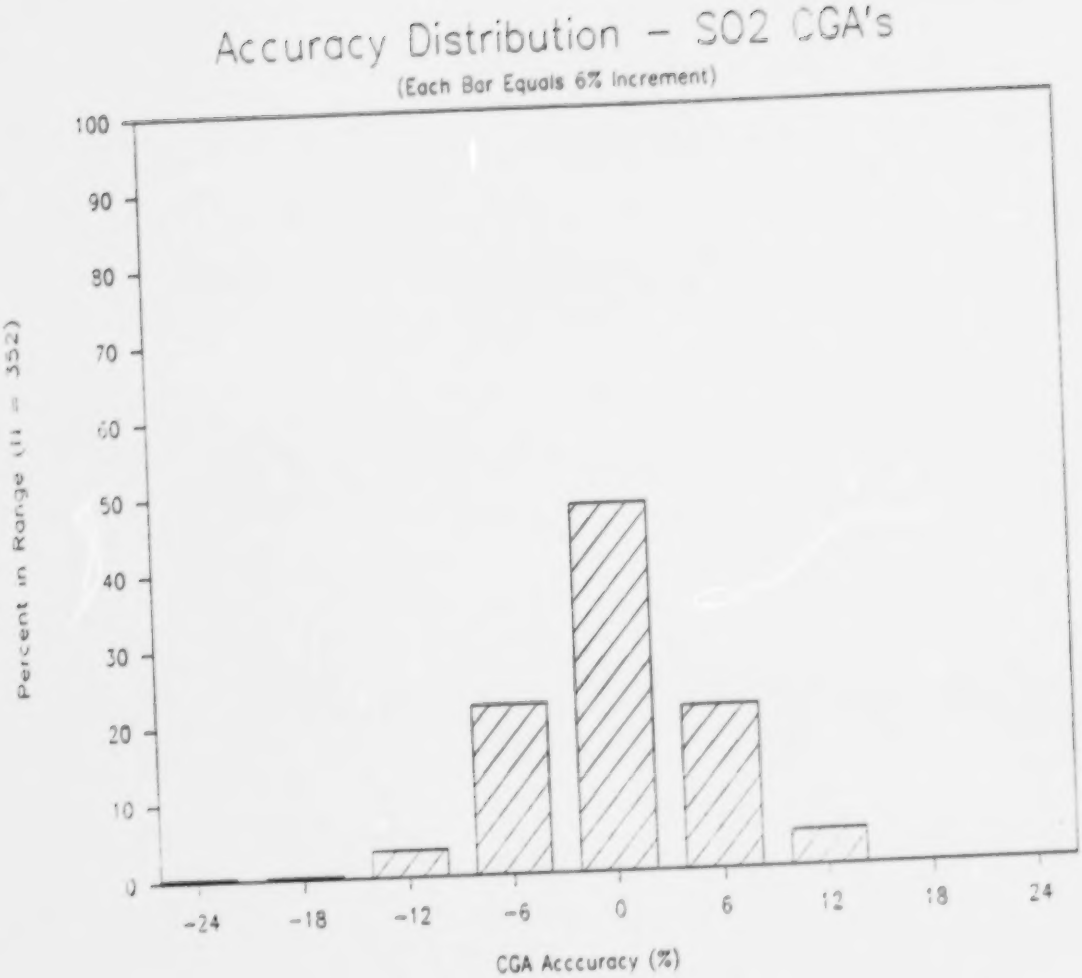

Accuracy Distribution – SO2 CGA's
(Each Bar Equals 6% Increment)
Percent in Range (n = 352)
100
90
80
70
60
50
40
30
20
10
0
-24
-18
-12
-6
0
6
12
18
24
CGA Acccuracy (%)

Figure 10

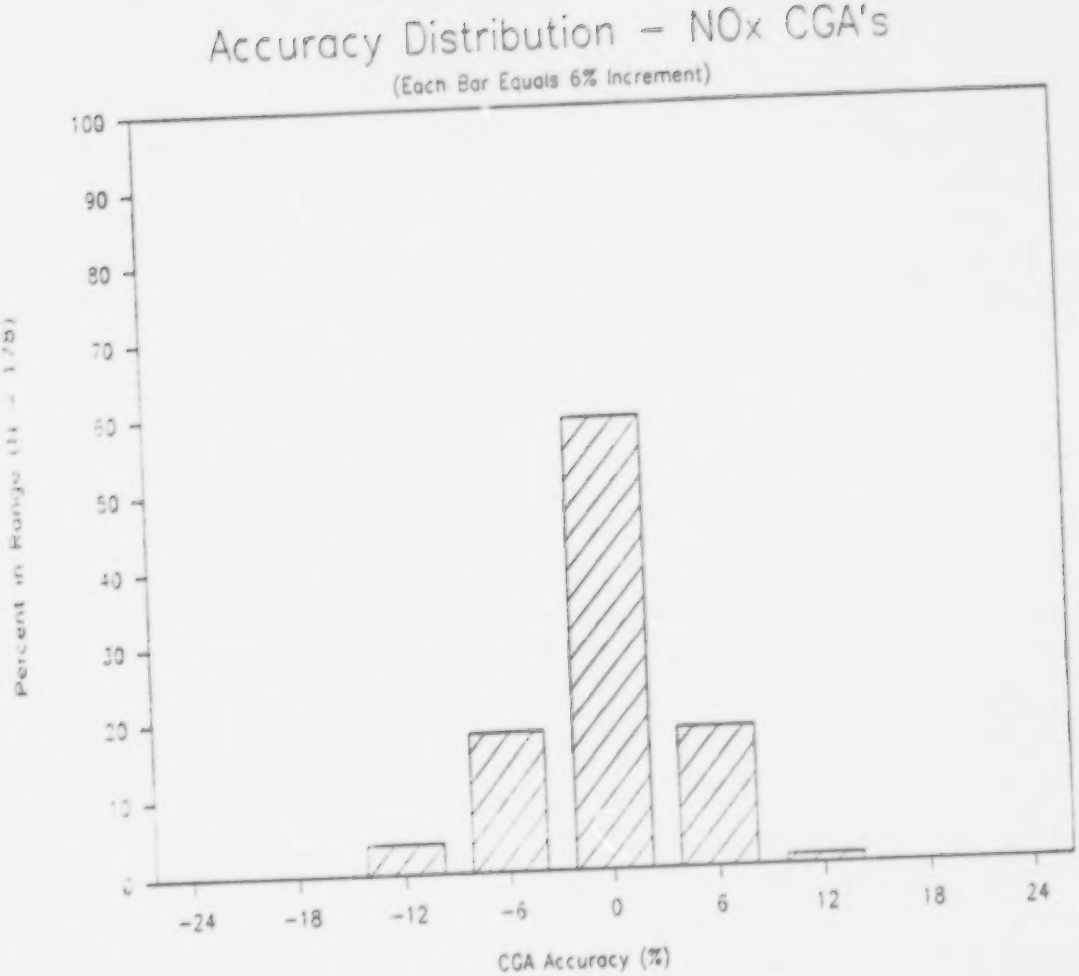

Accuracy Distribution – NOx CGA's
(Each Bar Equals 6% Increment)
100
90
80
70
60
50
40
30
20
10
0
-24
-18
-12
-6
0
6
12
18
24
CGA Accuracy (%)

Figure 11

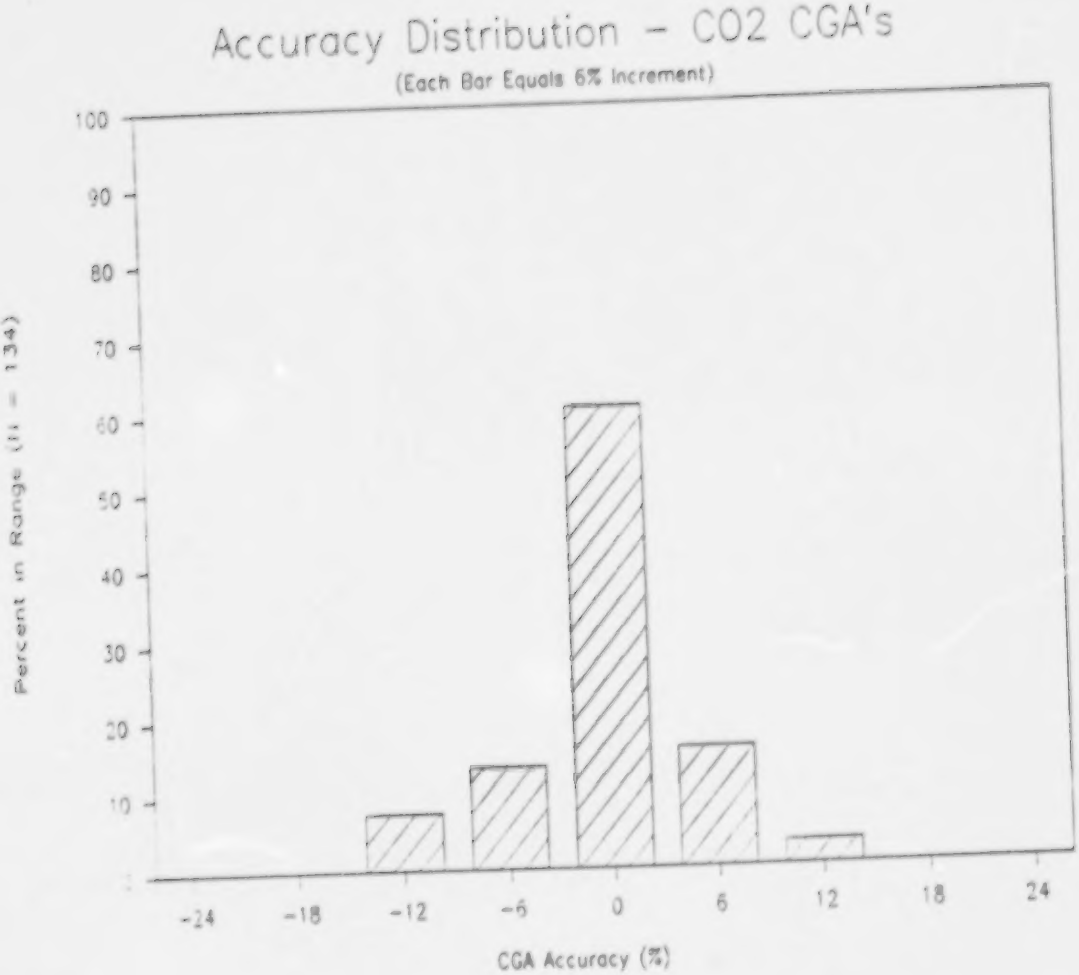

Accuracy Distribution – CO2 CGA's
(Each Bar Equals 6% Increment)
Percent in Range (n = 134)
100
90
80
70
60
50
40
30
20
10
-24
-18
-12
-6
0
6
12
18
24
CGA Accuracy (%)

Figure 12

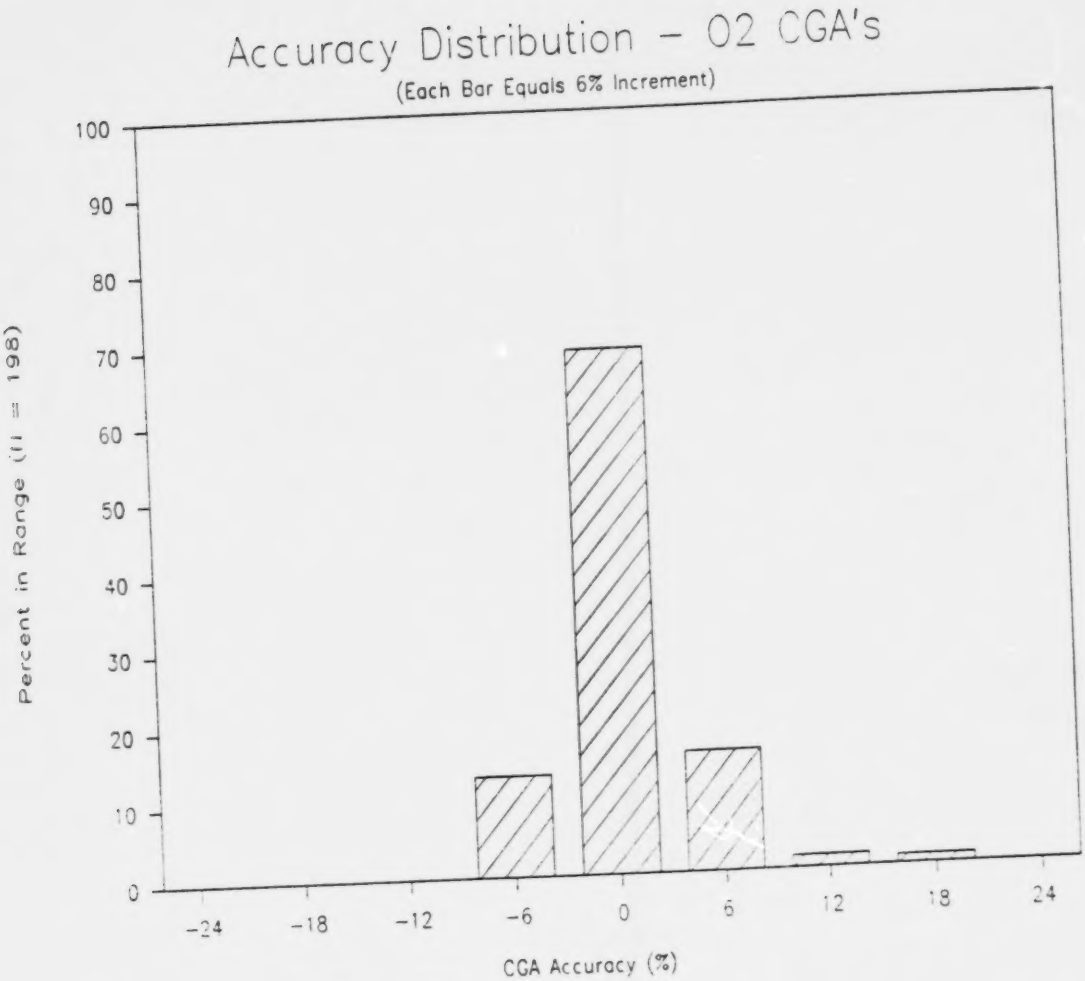

Accuracy Distribution – 02 CGA's
(Each Bar Equals 6% Increment)
Percent in Range (N = 198)
100
90
80
70
60
50
40
30
20
10
0
-24
-18
-12
-6
0
6
12
18
24
CGA Accuracy (%)

Figure 13

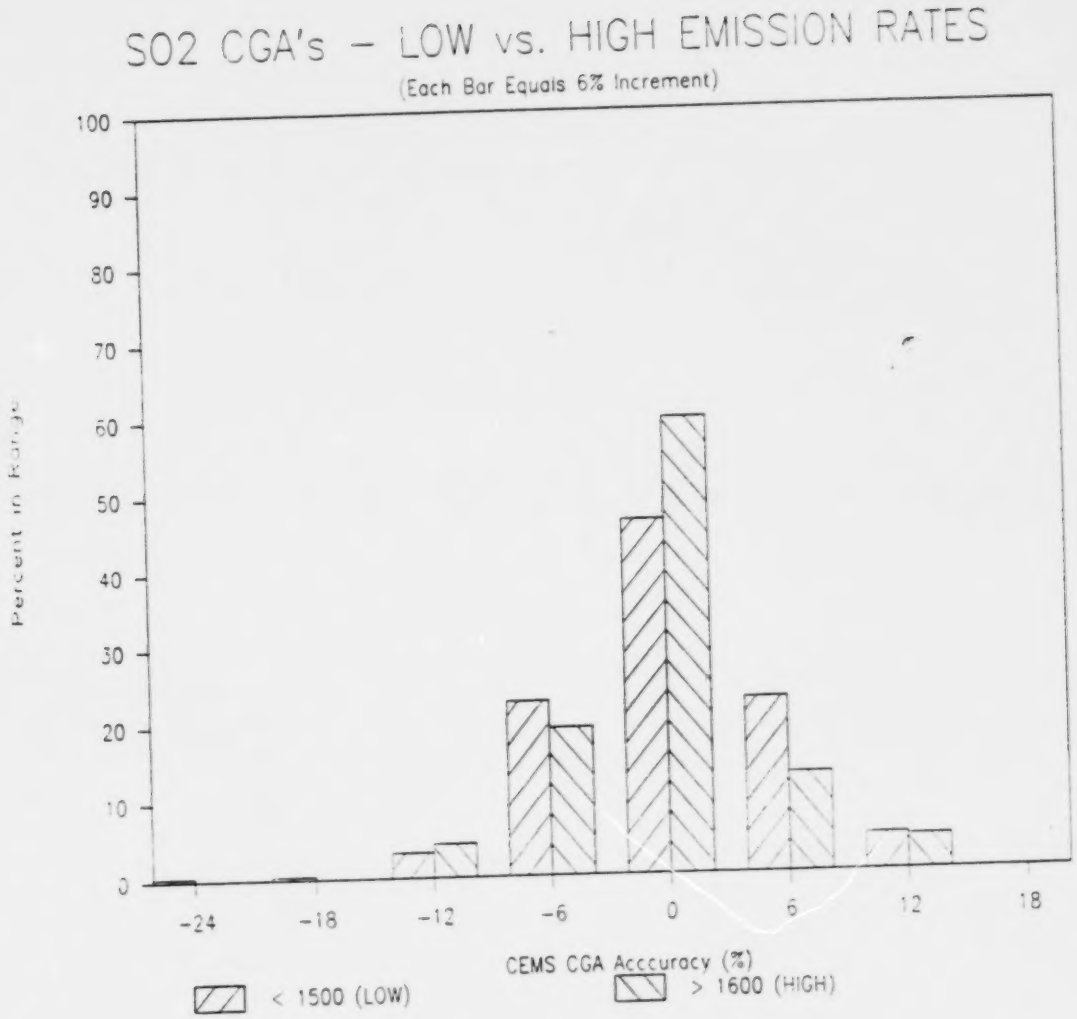
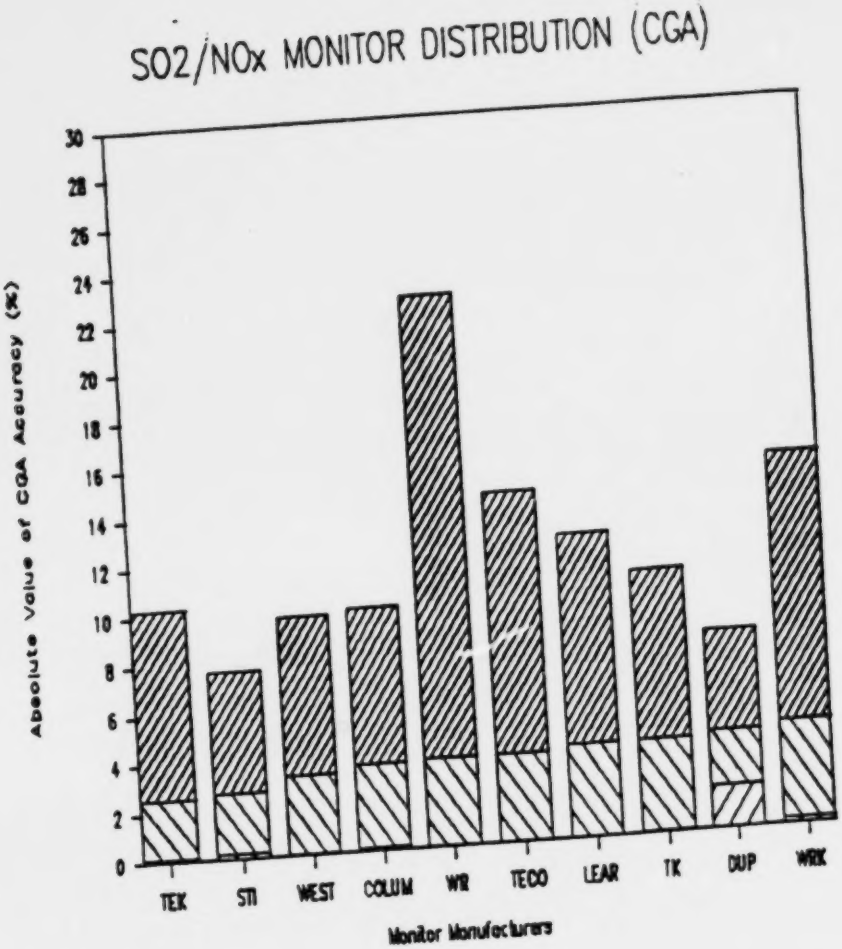

SO2 CGA's – LOW vs. HIGH EMISSION RATES
(Each Bar Equals 6% Increment)
Percent in Range
100
90
80
70
60
50
40
30
20
10
0
-24
-18
-12
-6
0
6
12
18
CEMS CGA Acccuracy (%)
< 1500 (LOW)
> 1600 (HIGH)

Figure 14

Figure 15



ACS - Automated Custom Systems
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HORIB - Horiba
STI - Sampling Technology
TEK - Thermo Environmental - (KVB)
TK - Thermox - (KVB)
WR - Western Research
NR - Not Reported

COLUM - Columbia Scientific
DUP - Dupont
LEAR - Lear Siegler
TECO - Thermo Environmental Co.
THERM - Thermox
WEST - Westinghouse
WRK - Western Research - (KVB)

MONITOR	AVERAGE	MINIMUM	MAXIMUM
TEK	2.60	0.16	10.28
STI	2.71	0.25	7.69
WEST	3.31	0.09	9.80
COLUM	3.56	0.16	9.94
WR	3.61	0.00	22.57
TECO	3.61	0.00	14.32
LEAR	3.83	0.00	12.40
TK	3.85	0.09	10.78
DUP	4.04	1.77	8.17
WRK	4.24	0.23	15.25

6. RELATIVE ACCURACY AUDITS

Appendix F includes a provision for conducting an audit of those CEMS's that cannot be checked with a CGA. The technique is called an Relative Accuracy Audit (RAA). It is based on a comparison of CEMS response with EPA TM measurements. For the RAA, the average of three measurements are compared directly and reported as a percent Accuracy, comparable to the results of the CGA. The criterion for acceptable performance is a RA within $\pm$15%.

Data on RAA's were submitted by two facilities (4KY05.1 and 4SC06.1) and are contained in Appendix D. The Kentucky facility performed the audit for the SO_2 and NO_x CEMS's. The audit at the South Carolina facility was performed for a back-up SO_2 analyzer.

7. CALIBRATION DRIFT ASSESSMENT

7.1 GENERAL INFORMATION

Section 60.13 of the NSPS General Provisions requires a daily assessment of drift and corrective action if the drift exceeds two times the applicable specification in 40 CFR Part 60 Appendix B. For SO_2 and NO_x, the applicable specification is 2.5 percent of span; for O_2 and CO_2 it is 0.5 percent of the reference value. Appendix F reiterates the requirement for a daily assessment of drift and defines the procedure as a Calibration Drift Assessment (CDA). Appendix F also defines the CEMS as OOC if the CDA shows that drift exceeds:

- Two times the allowable Appendix B specification for five consecutive days, or
- Four times the allowable Appendix B specification in a single day.

Seventeen facilities reported OOC periods as a result of excessive calibration drift (CD). The facilities are listed in Table 4, along with a notation indicating which analyzers were identified as having excessive CD. Eleven of the facilities listed an OOC period in more than one quarter, and 12 of the facilities listed an OOC period for more than one analyzer.

7.2 DURATION OF OOC PERIODS DUE TO EXCESSIVE CD

By definition, CD can only be determined after one day of operation of the CEMS without manual adjustment. In addition, an OOC period due to excessive CD is defined as the period starting with the day the excessive CD is detected and ending with the day on which no excessive CD is demonstrated. Therefore, the minimum duration of an OOC period due to excessive CD is one day.

TABLE 4.

OUT OF CONTROL SUMMARY

	1988				1989			
Unit Code	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
4FL01.1	SO_2, NO_x O_2	SO_2	NR	NR	NR	NR	NR	NR
4FL03.1	SO_2, NO_x CO_2, O_2	R	NR	NR	NR	NR	NR	NR
4FL03.2	SO_2, O_2	O_2	NR	NR	NR	NR	NR	NR
4FL04.1	O_2	R	R	R	R	NR	NR	NR
5MI04.1	SO_2, NO_x	R	NR	NR	NR	NR	NR	NR
6NM01.1	NR	SO_2, NO_x O_2	SO_2, NO_x	SO_2	NO_x	NR	NR	NR
60K02.1	R	NO_x	R	R	R	R	NR	NR
6TX03.1	SO_2, NO_x	R	R	R	SO_2, NO_x	SO_2	NR	NR
6TX03.2	SO_2, NO_x CO_2	R	R	R	SO_2, NO_x CO_2	SO_2, NO_x CO_2	NR	NR
6TX04.1	SO_2, NO_x CO	R	NR	R	R	R	NR	NR
7IA01.1	SO_2, NO_x O_2	NR	NO_x, CO_2 O_2	NO_x, O_2	NO_x	O_2	NR	NR
7KS02.1	R	R*	R*	R	R*	NR	NR	NR
8C001.1	R	R	R	R	NO_x	NR	NR	NR
8C001.2	NR	NR	CO_2	NR	CO_2	NR	NR	NR
8ND03.1	R	SO_2, NO_x O_2	SO_2, NO_x	SO_2, NO_x	SO_2	NR	NR	NR
9NV03.1	SO_2	R	R	R	SO_2, NO_x O_2	NR	NR	NR
9NV04.1	R	SO_2	SO_2, NO_x	R	O_2	NR	NR	NR

*Specified Out of Control Period, but did not report which analyzers
R - Received Report (No OOC Period); NR - Did Not Receive Report

Several facilities reported OOC periods in days, while others reported OOC periods as fractions of a day. Many of these facilities reported different OOC periods for all their separate analyzers. In these cases, it would be difficult for an agency person to relate the OOC periods to Da minimum data requirements, because of multiple, overlapping periods for several analyzers in the same CEMS.

Twelve facilities reported the date and time of day for the start and end of OOC periods. For many of the entries, the end of the OOC period generally appears to be the time when the analyzer was recalibrated after corrective action. In other cases, the OOC periods appear to be the time an analyzer was off-line for periodic maintenance or recalibration.

7.3 CORRECTIVE ACTIONS FOR EXCESSIVE CALIBRATION DRIFT

Table 5 is a list of corrective actions as noted in the DAR's. The number shown to the right of each item is the number of times the specific item is mentioned. Manual calibration and resetting of the automatic drift compensator are indicated the most. Replacement of analyzer lamps and calibration gas are the next most frequent corrective actions. More than 60 percent of the corrective actions are in the category of Periodic Maintenance and Calibration.

7.4 CONCLUSIONS ON CALIBRATION DRIFT ASSESSMENT

1. Failure to meet the CD criteria for acceptable performance as defined in Appendix F is a problem common to all CEMS's. Calibration drift appears to be commonly reported as an OOC period, whereas, audit failures seem to occur a small percentage of time.

2. In many cases, facility personnel did more than what was required by Appendix F in reporting all periods when a CEMS is off-line for maintenance or calibration for any duration of time.

8. FORMAT OF THE DATA ASSESSMENT REPORTS

Appendix F includes an example format for a DAR. Except for a few cases, the example format or a slight modification of the example was followed. In those cases where the example format was not followed, the audit results appear to be included as portions of more comprehensive quarterly reports.

Table 5.

CORRECTIVE ACTIONS

Periodic Maintenance or Calibration	(119)
Manual Calibration/Recalibration	41
Adjust Analyzer	23
Replace Calibration Gas	15
General Preventive Maintenance	6
Reset Drift	6
Clean Analyzer Cell	5
Clean Extraction System	3
Repair Leaks	3
Adjust Heater	2
Drain Moisture from Sample Lines	2
Clean Probe	2
Clean Ports	1
Adjust Calibration Gas Pressure	1
Adjust Flow Rate	1
Changed Vacuum Pump Oil	1
Clean Convection Loop	1
Clean Filter	1
Clean Oxygen Analyzer Furnace	1
Insulate Line	1
Repair Vacuum Pump	1
Replace Filter	1
Replace Lamp Power Supply	1
Analyzer Repair	(32)
Replace Analyzer Lamp	8
Replace Thermal Fuse	3
Replace Analyzer Cell	3
Readjust/Realign Ball Valve	2
Replace Capillaries	2
Replace Oxygen Furnace Cell	2
Replace Resistance Temperature Detector	2
Adjust Lamp Current	1
Repair Stack Linearizer Card	1
Replace Ceramic Diffusion Element for SO_2 Probe	1
Replace Condenser Traps	1
Replace Diaphragm in Valve	1
Replace NO_x Converter	1
Replace Radiation Rejection Filter	1
Replace Scanner	1
Replace Temperature Controller Card for SO_2 Probe	1
Tighten Loose Fitting on Oven Cell	1
Calibration Gas System Repair	(7)
Thaw Calibration Line	4
Replace Calibration Gas Check Valve	2
Replace Calibration Gas Regulator	1
Other Corrective Actions	(13)
Replace Electronic Board in Computer	4
Repair Air Conditioner for CEMS Cabinet	3
Repair Damaged Cable	2
Replace Relay	2
Reinitialize Computer	1
Replace Interface Chip in Computer	1
Number of Items Listed	**48**
Number of Corrective Actions	**171**

APPENDIX A

MONITOR MANUFACTURER INFORMATION

MONITOR MANUFACTURER INFORMATION

Gas	Manufacturer	Model	Type	Serial Number
** Unitcode - 2NY01.1				
NO_x	LEAR	SM-810	2	113742V
O_2	LEAR	CM-50	2	113943
O_2	LEAR	CM-50	2	122908
O_2	LEAR	CM-50	2	122909
SO_2	LEAR	SM-810	2	102662U
SO_2	LEAR	SM-810	2	102663U
SO_2	LEAR	SM-810	2	113742V
** Unitcode - 3PA01.1				
CO_2	LEAR	EX4700	2	NR
NO_x	LEAR	SM-8100	2	NR
SO_2	LEAR	SM-8100	2	NR
** Unitcode - 4FL01.1				
NO_x	TECO	10AR	1	15200-349
O_2	THERM	WDG-III	1	C06030377-1
SO_2	WR	721A	1	6709-6
** Unitcode - 4FL03.1A				
NO_x	LEAR	SM-810	2	062639V
O_2	LEAR	CM-50	2	062889
O_2	LEAR	CM-50	2	062891
O_2	LEAR	CM-50	2	062892
SO_2	LEAR	SM-810	2	062639V
SO_2	LEAR	SM-810	2	062640U
SO_2	LEAR	SM-810	2	062641U
** Unitcode - 4FL03.2				
NO_x	LEAR	SM-810	2	033695V
O_2	LEAR	CM-50	2	033920
O_2	LEAR	CM-50	2	033922
O_2	LEAR	CM-50	2	062891
SO_2	LEAR	SM-810	2	033693U
SO_2	LEAR	SM-810	2	033694U
SO_2	LEAR	SM-810	2	033695V
** Unitcode - 4FL04.1				
NO_x	DUP	461	1	6522
NO_x	LEAR	SM-810	2	073723V
O_2	LEAR	CM-50	2	073932
O_2	LEAR	CM-50	2	073933
SO_2	LEAR	SM-810	2	073722U
SO_2	LEAR	SM-810	2	073723V

Gas	Manufacturer	Model	Type	Serial Number
** Unitcode - 4KY05.1				
CO_2	CON	GEM-100	3	1121
CO_2	CON	GEM-100	3	1122
CO_2	CON	GEM-100	3	1123
NO_x	CON	GEM-100	3	1121
NO_x	CON	GEM-100	3	1122
NO_x	CON	GEM-100	3	1123
SO_2	CON	GEM-100	3	1121
SO_2	CON	GEM-100	3	1122
SO_2	CON	GEM-100	3	1123
** Unitcode - 4SC06.1				
NO_x	LEAR	802-820-81	1	S06889
O_2	LEAR	802-820-81	1	R01757
SO_2	LEAR	802-820-81	1	R01757
** Unitcode - 5IN01.1				
NO_x	TEK	10AR	1	17079167
O_2	TK	III	1	C029118-4
SO_2	WRK	721	1	85-721A-6293-1
** Unitcode - 5IN01.2				
NO_x	TECO	10AR	1	17079167
O_2	TK	WDG-III	1	C029118-4
SO_2	WRK	721A	1	85-721A-6293-1
** Unitcode - 5IN02.1				
CO_2	HORIBA	PIR-2000	1	503041
CO_2	HORIBA	PIR-2000	1	404013
NO_x	TECO	10AR	1	10AR-18138-176
SO_2	TECO	40	1	40-18192-177
SO_2	TECO	40	1	40-18233-177
** Unitcode - 5IN02.2				
CO_2	HORIBA	PIR-2000	1	40413
SO_2	TECO	40	1	40-18191-177
** Unitcode - 5MI03.1				
NO_x	LEAR	SM-810	2	062647V
O_2	LEAR	CM-50	2	062890
SO_2	DUP	460	1	5882
SO_2	LEAR	SM-810	2	062647V
** Unitcode - 5MI04.1				
NO_x	LEAR	SM-810	2	121615V
O_2	LEAR	CM-50	2	121880
O_2	LEAR	SM-810	2	111609V
SO_2	LEAR	SM-810	2	111609V
SO_2	LEAR	SM-810	2	121615V

Gas	Manufacturer	Model	Type	Serial Number
** Unitcode - 5MN06.1				
CO_2	LEAR	EX4700	2	0170074
NO_x	LEAR	SM-8100	2	0171120U
O_2	LEAR	CM-60	2	0170113
SO_2	LEAR	SM-8100	2	0171118U
SO_2	LEAR	SM-8100	2	0171120U
** Unitcode - 6NM01.1				
NO_x	TECO	10AR	1	KVB #15200
O_2	TK	3400	1	C015868
SO_2	WR	721/721A	1	82-721A-6541-5
** Unitcode - 60K02.1				
CO_2	TECO	M100	3	100-1134-0009
NO_x	TECO	M100	3	100-1134-0009
SO_2	TECO	M100	3	100-1134-0009
SO_2	TECO	M200	4	43-17357-169
** Unitcode - 6TX03.1				
CO_2	ACS	Fuji 3300	1	N4L0871T
NO_x	TECO	10AR	1	10A/R-17080-167
SO_2	WR	721A	1	84-721A-6286-1
** Unitcode - 6TX03.2				
CO_2	ACS	Fuji 3300	1	N4P1572T
NO_x	TECO	10AR	1	180009/174
SO_2	WR	721A	1	84-721A-6286-1
SO_2	WR	721A	1	85-721A-6709-5
** Unitcode - 6TX03.3				
CO_2	ACS	Fuji 3300	1	2E-0047
NO_x	TECO	10AR	1	13-601-139
SO_2	WR	721A	1	6541-1
** Unitcode - 6TX04.1				
CO_2	STI	DP-0303	5	1354
NO_x	STI	114V(8840)	5	1354
O_2	STI	DP-0303	5	1354
O_2	WEST	1500	2	1209
SO_2	STI	200	5	8840
SO_2	WEST	1500	2	1209
** Unitcode - 7IA01.1				
NO_x	TEK	10AR	1	10AR-17799-173
NO_x	TEK	10AR	1	17799-173
O_2	TK	WDG-III	1	C030377-6
SO_2	WRK	721A	1	85-721-6713-2
SO_2	WRK	721A	1	88-721AR-7310-1

Gas	Manufacturer	Model	Type	Serial Number
** Unitcode - 7KS02.1				
CO	TEK	Fuji 3300	1	2E0048
NO_x	TECO	10AR	1	13656-140
O_2	THERM	WDG-III	1	332-2-02-31
O_2	WEST	218	1	174G-04
SO_2	LEAR	SM-810	2	122680U
SO_2	LEAR	SM-810	2	122681U
SO_2	LEAR	SM-810	2	122682U
SO_2	WR	721A	1	61541-3
** Unitcode - 8C001.1				
CO_2	HORIB	PIR-2000	1	NR
NO_x	TECO	14B-E-200	4	NR
SO_2	COLUM	SA700	4	NR
** Unitcode - 8C001.2				
CO_2	ACS	Fuji 3300	1	NR
NO_x	TECO	14B-E-200	4	NR
SO_2	COLUM	SA700	4	NR
** Unitcode - 8C002.1				
CO_2	TECO	200	4	NR
NO_x	TECO	10AR	4	NR
SO_2	TECO	40	4	NR
** Unitcode - 8ND03.1				
NO_x	LEAR	SM-8100	2	04610650
O_2	LEAR	SM-8100	2	0461065
SO_2	LEAR	SM-8100	2	04610650
** Unitcode - 8UT04.1				
NO_x	TECO	10AR	1	151777-153
O_2	THERM	WDG-II	1	C019525-2
SO_2	WR	721A	1	86-721A-6755
** Unitcode - 8UT05.1				
NO_x	TEK	10AR	1	16553-162
NO_x	TEK	10AR	1	19309-183
O_2	TK	WDG-III	1	C026344-1
O_2	TK	WDG-III	1	C026776-1
SO_2	WRK	721A	1	86-721A-6245-3
** Unitcode - 8UT05.2				
NO_x	TECO	10AR	1	10AR-19312-182
NO_x	TECO	10AR	1	16514-162
O_2	THERM	WDG-III	1	C026776-3
SO_2	WR	721A	1	86-721A-6245-1
** Unitcode - 8UT06.1				
CO_2	TECO	200	4	N5C1248T
NO_x	TECO	10AR	4	14B-200-18668-180
SO_2	TECO	40	4	43-200-18304-17B

Gas	Manufacturer	Model	Type	Serial Number
** Unitcode - 9CA01.1				
CO_2	LEAR	EX4700A	2	0470081
NO_x	LEAR	SM-8100	2	0371144 U
SO_2	LEAR	SM-8100	2	0371144 U
** Unitcode - 9NV03.1				
NO_x	TEK	10AR	1	10AR-1236-127-S
O_2	THERM	NR	1	20-8050-332-8-02-31
SO_2	WRK	721	1	81-721-6492-1
** Unitcode - 9NV04.1				
NO_x	LEAR	SM-810	2	2MBA AE 212
O_2	LEAR	CM-50	2	2MBA AE 213
SO_2	LEAR	SM-810	2	2MBA AE 212

Relative Accuracy Test Audit Data

Date	Method	Gas	RM	CEMS	Difference	Confidence Coefficient	Reported Relative Accuracy	Recalculated Relative Accuracy
** Unit Code - 2NY01.1								
02/22/88	6C	SO_2	3.701	3.579	0.1220	0.0620	5.00	4.97
02/24/88	6C	SO_2	4.190	4.100	0.0900	0.0360	3.00	3.01
02/25/88	7E	NO_x	0.566	0.495	0.0710	0.0060	13.60	13.60
02/25/88	6C	SO_2	0.541	0.511	0.0300	0.0360	12.10	12.20
05/15/89	7E	NO_x	0.539	0.567	0.0280	0.0120	7.40	7.42
05/15/89	6A	SO_2	0.539	0.541	0.0020	0.0100	2.30	2.23
05/24/89	6A	SO_2	3.777	3.589	0.1880	0.1050	7.50	7.76
05/24/89	6A	SO_2	3.272	3.026	0.2460	0.1510	12.10	12.13
** Unit Code - 4FL01.1								
01/21/88	7E	NO_x	0.546	0.561	0.0150	0.0082	4.30	4.25
01/21/88	6C	SO_2	6.254	6.241	0.0130	0.0435	0.90	0.90
01/21/88	3A	SO_2	0.542	0.563	0.0210	0.0096	5.80	5.65
** Unit Code - 4FL03.1								
02/24/88	7E	NO_x	0.348	0.396	0.0480	0.0120	8.10	17.24
02/24/88	6	SO_2	0.748	0.670	0.0780	0.0180	12.80	12.83
02/26/88	6	SO_2	4.330	4.090	0.2400	0.1500	9.20	9.01
02/26/88	6	SO_2	4.590	4.070	0.5200	0.1300	14.30	14.16
** Unit Code - 4FL03.2								
02/23/88	7E	NO_x	0.372	0.398	0.0260	0.0100	9.70	9.68
02/23/88	6	SO_2	0.543	0.558	0.0150	0.0430	18.00	10.68
02/25/88	6	SO_2	4.350	3.920	0.4300	0.1400	13.10	13.10
** Unit Code - 4FL04.1								
02/11/88	7E	NO_x	0.437	0.455	0.0180	0.0030	3.50	4.81
02/11/88	6C	SO_2	0.275	0.336	0.0610	0.0048	7.90	23.93
02/19/88	7E	NO_x	0.407	0.458	0.0510	0.0018	8.60	12.97
02/19/88	6C	SO_2	4.990	5.214	0.2240	0.0668	5.80	5.83
03/14/89	7E	NO_x	0.429	0.380	0.0492	0.0050	9.00	12.63
03/14/89	6C	SO_2	5.089	4.767	0.3216	0.1156	9.00	8.59
03/16/89	7E	NO_x	0.425	0.425	0.0004	0.0082	1.40	2.02
03/16/89	6C	SO_2	0.631	0.680	0.0483	0.0027	6.20	8.07
** Unit Code - 4KY05.1								
02/15/88	6C	SO_2	0.679	0.611	0.0680	0.0180	4.00	12.67
02/18/88	7E	NO_x	0.458	0.396	0.0620	0.0120	16.00	16.16
02/18/88	6C	SO_2	6.792	6.538	0.2540	0.0350	4.00	4.26
02/22/88	6C	SO_2	6.726	6.091	0.6350	0.0380	10.00	10.01
02/15/89	7C	NO_x	0.662	0.602	0.0600	0.0111	6.00	10.74
02/16/89	7C	NO_x	0.625	0.606	0.0190	0.0184	6.00	5.98
** Unit Code - 4SC06.1								
03/31/88	7	NO_x	0.440	0.460	0.0200	0.0142	7.70	7.77
03/31/88	6	SO_2	0.510	0.540	0.0300	0.0083	6.30	7.52
03/31/88	6	SO_2	1.610	1.650	0.0400	0.0334	4.50	4.56

Date	Method	Gas	RM	CEMS	Difference	Confidence Coefficient	Reported Relative Accuracy	Recalculated Relative Accuracy
** Unit Code - 5IN01.1								
05/31/89	NR	NO_x	0.420	0.404	0.0160	0.0076	5.70	5.62
05/31/89	NR	SO_2	0.550	0.502	0.0480	0.0236	13.00	13.02
06/02/89	NR	SO_2	5.760	5.602	0.1580	0.0365	3.40	3.38
** Unit Code - 5IN02.1								
02/19/88	7	NO_x	0.560	0.512	0.0485	0.0083	10.12	10.14
02/19/88	6	SO_2	0.264	0.255	0.0090	0.0106	7.43	7.43
03/23/88	6	SO_2	5.809	5.839	0.0300	0.0781	1.86	1.86
03/23/88	6	SO_2	5.810	6.030	0.2200	0.0909	5.41	5.35
03/29/89	7E	NO_x	0.491	0.499	0.0080	0.0040	2.40	2.44
03/29/89	6C	SO_2	0.422	0.436	0.0140	0.0080	5.30	5.21
03/30/89	6C	SO_2	5.538	5.546	0.0080	0.0620	1.30	1.26
03/31/89	6C	SO_2	5.476	5.898	0.4220	0.1660	10.80	10.74
** Unit Code - 5IN02.2								
03/06/89	6C	SO_2	1.006	0.897	0.1090	0.0260	13.40	13.42
** Unit Code - 5MI03.1								
06/03/88	7E	NO_x	0.402	0.412	0.0094	0.0189	7.10	7.04
06/03/88	6C	SO_2	1913.100	1740.200	172.9000	80.5000	13.20	13.25
06/04/88	6C	SO_2	0.484	0.463	0.0216	0.0221	9.00	9.02
05/15/89	6C	SO_2	1634.000	1718.400	84.4000	43.8000	7.80	7.85
05/16/89	7E	NO_x	0.303	0.297	0.0060	0.0020	2.70	2.64
05/16/89	6C	SO_2	0.366	0.382	0.0160	0.0060	5.90	6.01
** Unit Code - 5MI04.1								
03/01/88	NR	SO_2	-	-	-	-	32.90	-
03/02/88	NR	SO_2	-	-	-	-	11.40	-
04/28/88	NR	NO_x	-	-	-	-	30.20	-
06/01/88	NR	O_2	-	-	-	-	8.80	-
06/02/88	NR	O_2	-	-	-	-	3.30	-
** Unit Code - 5MN06.1								
09/14/88	7	CO_2	0.350	0.360	0.0100	0.0180	8.10	8.00
09/14/88	7	NO_x	0.350	0.360	0.0100	0.0180	8.10	8.00
09/14/88	3	O_2	6.470	5.900	0.5700	0.1590	11.30	11.27
09/14/88	6	SO_2	1.310	1.260	0.0500	0.0430	7.00	7.10
09/15/88	7	CO_2	10.880	11.910	1.0300	0.3860	13.00	13.01
09/15/88	6	SO_2	0.310	0.302	0.0080	0.0250	10.50	10.65
** Unit Code - 6NM01.1								
06/21/88	7	NO_x	205.800	210.100	4.3000	6.0200	9.80	5.01
06/21/88	6	SO_2	55.000	62.660	7.6600	1.4300	16.54	16.53
06/22/88	6	SO_2	786.300	797.000	10.7000	32.8000	7.56	5.53
06/22/88	6	SO_2	796.600	839.300	42.7000	44.7400	10.97	10.98

Date	Method	Gas	RM	CEMS	Difference	Confidence Coefficient	Reported Relative Accuracy	Recalculated Relative Accuracy
** Unit Code - 60K02.1								
01/27/88	7E	NO_x	0.210	0.199	0.0110	0.0190	14.29	14.29
01/27/88	6	SO_2	0.382	0.394	0.0120	0.0250	9.69	9.69
01/28/88	6	SO_2	1.677	1.672	0.0050	0.0470	3.06	3.10
04/20/88	7E	NO_x	0.383	0.310	0.0730	0.0000	19.06	19.06
04/20/88	6	SO_2	1.430	1.420	0.0100	0.0000	1.42	0.70
04/20/88	6	SO_2	0.347	0.380	0.0330	0.0000	9.51	9.51
09/09/88	7E	NO_x	0.340	0.343	0.0030	0.0000	0.88	0.88
09/09/88	6	SO_2	1.000	0.990	0.0100	0.0000	0.70	1.00
09/09/88	6	SO_2	0.213	0.233	0.0200	0.0000	9.39	9.39
12/06/88	6	SO_2	0.780	0.790	0.0100	0.0000	1.30	1.28
12/21/88	7E	NO_x	0.227	0.230	0.0030	0.0000	1.32	1.32
12/21/88	6	SO_2	0.387	0.417	0.0300	0.0000	7.75	7.75
03/16/89	7E	NO_x	0.260	0.280	0.0200	0.0300	19.23	19.23
03/16/89	6	SO_2	0.330	0.370	0.0400	0.0200	18.18	18.18
03/17/89	6	SO_2	1.370	1.320	0.0500	0.0200	5.11	5.11
06/21/89	7E	NO_x	0.350	0.380	0.0300	0.0000	8.57	8.57
06/21/89	6	SO_2	1.673	1.467	0.2060	0.0000	12.37	12.31
06/21/89	6	SO_2	0.410	0.407	0.0030	0.0000	0.73	0.73
** Unit Code - 6TX03.1								
01/21/88	6	SO_2	3.030	2.580	0.4500	0.0561	16.50	16.70
01/22/88	7E	NO_x	0.620	0.470	0.1500	0.0101	24.80	25.82
01/22/88	6	SO_2	0.440	0.380	0.0600	0.0144	15.70	16.91
01/29/88	7E	NO_x	0.640	0.520	0.1200	0.0151	19.60	21.11
11/08/88	7E	NO_x	0.449	0.429	0.0200	0.0180	8.40	8.46
11/09/88	6	SO_2	3.380	3.140	0.2400	0.2183	9.20	13.56
11/11/88	6	SO_2	0.402	0.427	0.0250	0.0413	11.10	16.49
** Unit Code - 6TX03.2								
01/28/88	7E	NO_x	0.570	0.460	0.1100	0.0077	20.60	20.65
01/28/88	6	SO_2	3.160	3.020	0.1400	0.0379	5.50	5.63
01/28/88	6	SO_2	0.150	0.130	0.0200	0.0067	5.00	17.80
11/10/88	6	SO_2	3.680	3.710	0.0300	0.3678	11.90	10.81
11/12/88	7E	NO_x	0.571	0.542	0.0290	0.0310	10.50	10.51
11/12/88	6	SO_2	0.463	0.443	0.0200	0.0366	10.80	12.22
** Unit Code - 6TX03.3								
02/02/88	7E	NO_x	0.390	0.380	0.0100	0.0139	6.60	6.13
02/02/88	6	SO_2	0.230	0.250	0.0200	0.0141	12.40	14.83
02/03/88	6	SO_2	0.790	0.750	0.0400	0.0242	7.39	8.13
11/14/88	6	SO_2	0.958	0.998	0.0400	0.0220	6.50	6.47
11/15/88	7E	NO_x	0.399	0.347	0.0520	0.0086	14.60	15.19
11/15/88	6	SO_2	0.224	0.248	0.0240	0.0176	15.90	18.57

Date	Method	Gas	RM	CEMS	Difference	Confidence Coefficient	Reported Relative Accuracy	Recalculated Relative Accuracy
** Unit Code - 6TX04.1								
03/01/88	6	SO_2	0.230	0.180	0.0500	0.0300	34.78	34.78
03/03/88	10	CO	5.000	32.000	27.0000	4.0000	666.00	620.00
03/03/88	7E	NO_x	0.480	0.320	0.1600	0.0100	35.42	35.42
03/03/88	6	SO_2	0.830	0.690	0.1400	0.0100	18.07	18.07
05/17/88	6C	SO_2	0.378	0.351	0.0300	0.0250	13.76	14.55
05/31/89	NR	O_2	4.920	4.420	0.5000	0.1070	12.40	12.34
06/01/89	NR	CO	0.014	0.018	0.0000	0.0063	71.51	43.75
06/01/89	NR	CO_2	4.259	3.990	0.2700	0.1705	10.34	10.34
06/01/89	NR	NO_x	0.513	0.493	0.0200	0.0123	6.13	6.30
06/01/89	NR	SO_2	0.726	0.770	0.0400	0.0204	9.00	8.32
** Unit Code - 7IA01.1								
11/10/87	7E	NO_x	0.381	0.416	0.0350	0.0080	11.30	11.29
11/10/87	6C	SO_2	0.280	0.313	0.0330	0.0070	14.30	14.29
11/11/87	6C	SO_2	4.449	4.651	0.2020	0.0310	5.20	5.24
06/30/89	7E	NO_x	0.406	0.407	0.0010	0.0090	2.50	2.46
06/30/89	6C	SO_2	4.884	4.750	0.1340	0.0250	3.30	3.26
06/30/89	6C	SO_2	0.318	0.339	0.0210	0.0240	14.20	14.15
** Unit Code - 7KS02.1								
02/09/88	10	CO	0.042	0.019	0.0200	0.0062	69.00	62.38
02/09/88	3	O_2	0.220	0.200	0.0200	0.0061	8.70	11.86
02/09/88	6	SO_2	0.120	0.120	0.0000	0.0068	9.20	5.67
02/11/88	6	SO_2	0.740	0.740	0.0000	0.0318	4.50	4.30
11/17/88	3	CO	0.070	0.066	0.0000	0.0100	20.00	14.29
11/17/88	3	CO	0.067	0.066	0.0000	0.0030	6.00	4.48
11/17/88	7E	NO_x	0.251	0.244	0.0100	0.0020	3.20	4.78
11/17/88	6C	SO_2	0.179	0.178	0.0000	0.0040	2.80	2.23
11/21/88	3	O_2	0.635	0.647	0.0100	0.0340	7.20	6.93
11/21/88	6C	SO_2	0.637	0.647	0.0100	0.0330	6.60	6.75
** Unit Code - 8C001.1								
03/03/88	6	SO_2	0.560	0.562	0.0020	0.0170	3.39	3.39
03/03/88	6	SO_2	0.599	0.578	0.0210	0.0160	6.24	6.18
03/04/88	7	NO_x	0.294	0.294	0.0000	0.0210	7.54	7.14
03/04/88	6	SO_2	0.093	0.101	0.0080	0.0070	16.50	16.13
07/13/88	7E	NO_x	0.338	0.293	0.0450	0.0210	19.40	19.53
07/13/88	6C	SO_2	0.093	0.102	0.0090	0.0030	11.50	12.90
07/27/88	6C	SO_2	0.727	0.722	0.0050	0.0100	2.10	2.06
07/27/88	6C	SO_2	0.727	0.722	0.0050	0.0100	2.10	2.06
** Unit Code - 8C002.1								
09/01/87	3	CO_2	10.890	12.300	1.4100	0.0900	13.80	13.77
09/01/87	6	SO_2	0.108	0.098	0.0100	0.0020	10.70	11.11
09/02/87	3	CO_2	11.630	11.670	0.0400	0.4200	3.90	3.96
09/02/87	6	SO_2	0.619	0.534	0.0850	0.0260	17.60	17.93
09/03/87	7	NO_x	0.217	0.252	0.0350	0.0110	21.20	21.20

Date	Method	Gas	RM	CEMS	Difference	Confidence Coefficient	Reported Relative Accuracy	Recalculated Relative Accuracy
** Unit Code - 8ND03.1								
11/24/87	7A	NO_x	0.447	0.368	0.0790	0.0240	23.20	23.04
11/24/87	3	O_2	5.626	5.078	0.5480	0.2790	14.69	14.70
11/24/87	6	SO_2	0.471	0.490	0.0190	0.0170	7.51	7.64
02/18/88	7A	NO_x	0.501	0.490	0.0110	0.0040	2.93	2.99
02/18/88	3	O_2	5.144	4.580	0.5640	0.0920	12.75	12.75
** Unit Code - 8UT04.1								
05/12/88	7	NO_x	0.461	0.528	0.0670	0.0413	16.60	23.49
05/12/88	6	SO_2	0.025	0.026	0.0010	0.0017	8.60	10.72
** Unit Code - 8UT05.1								
06/14/88	NR	NO_x	-	-	-	0.0021	2.20	-
06/14/88	NR	NO_x	-	-	-	0.0033	3.50	-
06/14/88	NR	O_2	-	-	-	0.1853	8.90	-
06/14/88	NR	O_2	-	-	-	0.0999	3.70	-
06/14/88	NR	SO_2	-	-	-	0.0196	6.00	-
06/14/88	NR	SO_2	-	-	-	0.0084	14.90	-
** Unit Code - 8UT05.2								
06/15/88	NR	NO_x	-	-	-	0.0133	8.00	-
06/15/88	NR	NO_x	-	-	-	0.0486	2.80	-
06/15/88	NR	O_2	-	-	-	0.1653	4.10	-
06/15/88	NR	O_2	-	-	-	0.2758	7.40	-
06/15/88	NR	SO_2	-	-	-	0.0309	4.90	-
06/15/88	NR	SO_2	-	-	-	0.0102	15.20	-
** Unit Code - 8UT06.1								
09/13/88	3	CO_2	9.690	10.110	0.4200	0.0800	0.50	5.16
09/13/88	7	NO_x	9.800	9.170	0.6300	0.2000	8.50	8.47
09/13/88	8	SO_2	0.260	0.260	0.0000	0.0100	3.81	3.85
** Unit Code - 9NV03.1								
01/07/88	7E	NO_x	0.370	0.370	0.0000	0.0070	3.10	1.89
01/07/88	3A	O_2	9.100	9.000	0.1000	0.1410	2.50	2.65
01/07/88	6C	SO_2	0.120	0.124	0.0040	0.0040	8.10	6.67
05/20/88	7E	NO_x	0.387	0.351	0.0360	0.0038	10.50	10.28
05/20/88	3A	O_2	8.400	7.300	1.1000	0.1023	13.60	14.31
05/20/88	6C	SO_2	0.088	0.089	0.0010	0.0025	3.10	3.98
** Unit Code - 9NV04.1								
01/20/88	7E	NO_x	265.800	264.080	1.7200	1.8000	1.82	1.32
01/20/88	3A	O_2	5.610	5.490	0.1200	0.0700	3.50	3.39
01/20/88	3A	O_2	5.760	5.240	0.5200	0.0700	10.20	10.24
01/20/88	6C	SO_2	76.690	69.590	7.1000	3.6300	13.90	13.99
12/13/88	3C	O_2	5.250	5.550	0.3000	0.1800	8.60	9.14
12/14/88	7E	NO_x	314.000	338.000	24.0000	3.1600	8.60	8.65
12/14/88	3C	O_2	5.620	5.550	0.0700	0.0500	2.13	2.14
12/14/88	6C	SO_2	315.590	360.600	45.0100	31.1200	24.10	24.12
12/14/88	6C	SO_2	75.500	82.250	6.7500	1.7800	11.40	11.30

Cylinder Gas Audit Data

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 2NY01.1									
06/27/88	NO_x	330.100	348.400	5.50	5.54	813.800	810.700	-0.40	-0.38
06/27/88	O_2	6.266	6.206	-1.00	-0.96	13.020	12.857	-1.30	-1.25
06/27/88	SO_2	749.000	813.400	8.60	8.60	1640.000	1679.500	2.40	2.41
06/27/88	SO_2	325.000	334.000	2.80	2.77	816.000	820.200	0.50	0.51
06/28/88	O_2	6.266	6.533	4.30	4.26	13.020	13.176	1.20	1.20
06/28/88	O_2	6.266	6.146	-1.90	-1.92	13.020	12.734	-2.20	-2.20
06/28/88	SO_2	749.000	766.500	2.30	2.34	1640.000	1637.200	-0.20	-0.17
09/07/88	NO_x	330.100	330.100	0.00	0.00	813.800	779.500	-4.20	-4.21
09/07/88	O_2	6.266	6.813	8.70	8.73	13.020	13.535	4.00	3.96
09/07/88	SO_2	325.000	291.000	-10.50	-10.46	816.000	763.500	-6.40	-6.43
09/08/88	O_2	6.266	6.054	-3.40	-3.38	13.020	12.530	-3.80	-3.76
09/08/88	O_2	6.266	7.390	17.90	17.94	13.020	14.139	8.60	8.59
09/08/88	SO_2	749.000	841.900	12.40	12.40	1640.000	1732.200	5.60	5.62
09/08/88	SO_2	749.000	808.100	7.90	7.89	1640.000	1686.100	2.80	2.81
11/15/88	NO_x	330.100	326.300	-1.20	-1.15	904.600	883.300	-2.40	-2.35
11/15/88	O_2	6.266	6.771	8.10	8.06	13.020	13.499	3.70	3.68
11/15/88	SO_2	325.000	358.200	10.20	10.22	855.000	930.100	9.40	8.78
11/16/88	O_2	6.266	6.012	-4.10	-4.05	12.020	12.329	-5.30	2.57
11/16/88	SO_2	850.000	892.800	5.00	5.04	1640.000	1648.300	0.50	0.51
11/17/88	O_2	6.266	7.212	15.10	15.10	13.020	13.997	7.50	7.50
11/17/88	SO_2	850.000	892.800	5.00	5.04	1640.000	1649.600	0.60	0.59
02/10/89	O_2	6.266	6.274	0.10	0.13	13.020	12.835	-1.40	-1.42
02/16/89	O_2	6.266	6.388	2.00	1.95	13.020	13.086	0.50	0.51
03/01/89	SO_2	850.000	830.600	-2.30	-2.28	1640.000	1546.900	-5.70	-5.68
03/01/89	SO_2	850.000	894.400	5.20	5.22	1640.000	1649.500	0.60	0.58
03/03/89	NO_x	330.100	328.700	-0.40	-0.42	904.600	895.800	-1.00	-0.97
03/03/89	SO_2	325.000	337.500	3.80	3.85	850.000	915.700	7.70	7.73
03/06/89	O_2	6.266	6.355	1.40	1.42	13.020	12.962	-0.40	-0.45
** Unit Code - 3PA01.1									
09/30/88	SO_2	-	-	4.90	-	-	-	2.50	-
09/30/88	NO_x	-	-	5.70	-	-	-	4.20	-
09/30/88	CO_2	-	-	1.80	-	-	-	4.90	-
12/31/88	SO_2	-	-	2.40	-	-	-	7.60	-
12/31/88	NO_x	-	-	6.60	-	-	-	3.40	-
12/31/88	CO_2	-	-	3.90	-	-	-	0.80	-
03/31/89	SO_2	-	-	2.00	-	-	-	3.80	-
03/31/89	NO_x	-	-	2.20	-	-	-	4.50	-
03/31/89	CO_2	-	-	1.40	-	-	-	1.00	-
05/31/89	SO_2	-	-	1.20	-	-	-	2.90	-
05/31/89	NO_x	-	-	2.60	-	-	-	3.40	-
05/31/89	CO_2	-	-	5.50	-	-	-	3.40	-

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 4FL01.1									
04/12/88	NO_x	259.100	-	2.00	-	556.800	-	2.60	-
04/12/88	O_2	3.924	-	1.90	-	9.089	-	3.40	-
04/12/88	O_2	3.924	-	1.90	-	9.089	-	2.30	-
04/12/88	SO_2	900.200	-	2.50	-	2013.000	-	3.00	-
04/12/88	SO_2	89.390	-	-4.50	-	20.390	-	-6.40	-
** Unit Code - 4FL03.1									
06/28/88	NO_x	174.000	180.000	3.45	3.45	400.000	419.000	4.75	4.75
06/28/88	O_2	5.000	5.050	1.00	1.00	10.000	10.030	0.30	0.30
06/28/88	O_2	5.000	5.020	0.40	0.40	10.000	9.990	-0.10	-0.10
06/28/88	O_2	5.000	5.020	0.40	0.40	10.000	10.090	0.90	0.90
06/28/88	SO_2	780.000	787.000	0.90	0.90	1656.000	1659.000	0.18	0.18
06/28/88	SO_2	780.000	776.000	-0.51	-0.51	1656.000	1668.000	0.72	0.72
06/28/88	SO_2	187.000	175.000	-6.42	-6.42	410.000	384.000	-6.34	-6.34
** Unit Code - 4FL03.2									
06/24/88	NO_x	174.000	171.000	1.72	-1.72	400.000	387.000	-3.25	-3.25
06/24/88	O_2	5.000	5.010	0.20	0.20	10.000	10.040	0.40	0.40
06/24/88	O_2	5.000	5.010	0.20	0.20	10.000	10.010	0.10	0.10
06/24/88	O_2	5.000	5.000	0.00	0.00	10.000	10.060	0.60	0.60
06/24/88	SO_2	780.000	784.000	0.51	0.51	1656.000	1654.000	-0.12	-0.12
06/24/88	SO_2	780.000	769.000	-1.41	-1.41	1656.000	1634.000	-1.33	-1.33
06/24/88	SO_2	187.000	174.000	-6.95	-6.95	410.000	397.000	-3.17	-3.17
** Unit Code - 4FL04.1									
06/28/88	NO_x	98.630	98.670	0.00	0.04	199.500	191.200	-4.20	-4.16
06/28/88	O_2	4.999	5.000	0.00	0.02	8.974	8.990	0.20	0.18
06/28/88	O_2	4.999	5.033	0.70	0.68	8.974	9.000	0.30	0.29
06/28/88	SO_2	899.500	916.000	1.80	1.83	2009.000	2017.000	0.40	0.40
06/28/88	SO_2	83.990	78.900	-6.10	-6.06	197.400	189.600	-4.00	-3.95
06/29/88	NO_x	98.630	92.400	-6.30	-6.32	248.400	247.800	-0.20	-0.24
09/27/88	NO_x	100.500	102.100	1.60	1.59	199.500	191.200	-4.20	-4.16
09/27/88	O_2	4.999	5.100	2.00	2.02	8.974	9.000	0.30	0.29
09/27/88	SO_2	83.990	80.560	-4.10	-4.08	197.400	196.600	-0.40	-0.41
09/28/88	O_2	4.999	5.000	0.00	0.02	8.974	9.078	1.20	1.16
09/28/88	SO_2	899.500	893.900	-0.60	-0.62	2009.000	1902.000	-5.30	-5.33
09/29/88	NO_x	125.600	116.100	-7.60	-7.56	251.000	247.300	-1.50	-1.47
12/06/88	NO_x	125.600	121.700	-3.10	-3.11	251.000	266.600	6.20	6.22
12/06/88	O_2	4.999	5.100	2.00	2.02	8.974	9.100	1.40	1.40
12/06/88	SO_2	899.500	957.000	6.40	6.39	2009.000	1999.300	-0.50	-0.48
12/07/88	NO_x	100.500	99.100	-1.40	-1.39	199.500	185.200	-7.20	-7.17
12/07/88	O_2	4.999	5.200	4.00	4.02	8.974	9.200	2.50	2.52
12/07/88	SO_2	83.990	84.000	0.00	0.01	197.400	201.500	2.10	2.08

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 4SC06.1									
6/15/88	NO_x	252.000	248.520	-1.38	-1.38	539.000	541.340	0.43	0.43
06/15/88	O_2	4.99	5.030	0.87	0.80	10.000	10.070	0.70	0.70
06/15/88	SO_2	100.00	100.350	0.35	0.35	221.000	227.260	2.83	2.83
08/31/88	NO_x	251.00	229.550	-8.55	-8.55	539.000	528.280	-1.99	-1.99
08/31/88	O_2	4.99	5.010	0.40	0.40	10.000	10.010	0.07	0.10
08/31/88	SO_2	515.00	555.350	7.84	7.83	1170.000	1200.650	2.26	2.62
08/31/88	SO_2	99.10	94.260	-4.88	-4.88	226.000	212.980	-5.76	-5.76
11/29/88	NO_x	251.00	269.440	7.35	7.35	539.000	564.610	4.75	4.75
11/29/88	O_2	4.99	5.070	1.54	1.60	10.000	10.130	1.33	1.30
11/29/88	SO_2	515.00	567.560	10.21	10.21	1170.000	1198.820	2.46	2.46
11/29/88	SO_2	99.10	97.920	-1.19	-1.19	226.000	223.890	-0.93	-0.93
03/16/89	SO_2	515.00	558.000	8.35	8.35	1078.000	1161.780	7.77	7.77
** Unit Code - 5IN01.1									
03/08/88	NO_x	253.000	240.000	5.00	-5.14	490.000	473.000	4.00	-3.47
03/08/88	O_2	12.000	12.200	2.00	1.67	5.000	5.100	2.00	2.00
03/08/88	O_2	12.000	12.300	3.00	2.50	5.000	5.000	0.00	0.00
03/08/88	SO_2	2192.000	2307.000	5.00	5.25	1185.000	1233.000	4.00	4.05
03/08/88	SO_2	118.000	107.000	10.00	-9.32	214.000	193.000	10.00	-9.81
09/28/88	NO_x	247.000	246.000	0.40	-0.40	494.000	497.000	0.60	0.61
09/28/88	O_2	5.000	5.100	2.00	2.00	12.100	11.800	2.50	-2.48
09/28/88	O_2	5.000	5.100	2.00	2.00	12.100	11.800	2.50	-2.48
09/28/88	SO_2	1224.000	1300.000	6.20	6.21	2191.000	2360.000	7.70	7.71
09/28/88	SO_2	118.000	125.000	5.90	5.93	219.000	226.000	3.20	3.20
12/01/88	O_2	5.000	4.900	2.00	-2.00	12.100	12.000	0.80	-0.83
12/01/88	O_2	5.000	5.000	0.00	0.00	12.100	12.000	0.80	-0.83
12/01/88	SO_2	1224.000	1180.000	3.60	-3.59	2191.000	2200.000	0.40	0.41
12/01/88	SO_2	118.000	125.000	5.90	5.93	219.000	222.000	1.40	1.37
03/30/89	NO_x	247.000	245.000	0.80	-0.81	493.500	480.000	-2.60	-2.74
03/30/89	NO_x	247.000	250.000	1.20	1.21	493.500	488.000	-1.00	-1.11
03/30/89	O_2	12.070	12.000	-0.50	-0.58	5.045	4.800	-4.80	-4.86
03/30/89	O_2	12.070	11.880	-1.20	-1.57	5.045	4.800	-4.80	-4.86
03/30/89	SO_2	118.400	113.000	-4.20	-4.56	219.500	208.000	-5.00	-5.24
03/31/89	SO_2	1224.000	1268.000	3.60	3.59	2191.000	2200.000	0.40	0.41

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 5IN01.2									
04/22/88	NO_x	253.000	240.000	5.00	-5.14	490.000	472.000	4.00	-3.67
04/22/88	O_2	12.000	11.900	1.00	-0.83	5.000	5.100	2.00	2.00
04/22/88	O_2	12.000	12.100	1.00	0.83	5.000	5.100	2.00	2.00
04/22/88	SO_2	2192.000	2203.000	1.00	0.50	1185.000	1210.000	2.00	2.11
04/22/88	SO_2	118.000	100.000	15.00	-15.25	214.000	188.000	12.00	-12.15
12/21/88	NO_x	247.000	245.000	0.80	-0.81	493.000	495.000	0.40	0.41
12/21/88	O_2	5.000	4.600	8.00	-8.00	12.100	11.700	3.30	-3.31
12/21/88	O_2	5.000	4.600	8.00	-8.00	12.100	11.700	3.30	-3.31
12/21/88	SO_2	1224.000	1280.000	4.60	4.58	2191.000	2293.000	4.70	4.66
12/21/88	SO_2	118.000	116.000	1.70	-1.69	219.000	212.000	3.20	-3.20
03/09/89	NO_x	247.000	233.000	-5.50	-5.67	493.500	466.000	-5.50	-5.57
03/09/89	O_2	12.070	11.800	-2.20	-2.24	5.045	4.870	-3.30	-3.47
03/09/89	O_2	12.070	11.750	-2.60	-2.65	5.045	4.950	-2.00	-1.88
03/09/89	SO_2	1224.000	1157.000	-5.50	-5.47	2191.000	2120.000	-3.20	-3.24
03/09/89	SO_2	118.400	124.000	5.00	4.73	219.500	220.000	0.40	0.23
** Unit Code - 5IN02.1									
08/25/88	CO_2	6.300	6.270	-0.50	-0.48	14.240	13.970	-1.90	-1.90
08/25/88	CO_2	6.300	6.270	-0.50	-0.48	14.240	13.970	-1.90	-1.90
08/25/88	NO_x	361.500	343.700	-4.90	-4.92	908.700	903.000	-0.60	-0.63
08/25/88	SO_2	910.800	950.300	4.30	4.34	2000.700	1905.000	-4.80	-4.78
08/25/88	SO_2	910.800	963.700	5.80	5.81	2000.700	1932.300	-3.40	-3.42
08/25/88	SO_2	364.000	407.000	11.80	11.81	844.200	872.700	3.40	3.38
08/26/88	CO_2	5.880	5.470	-7.00	-6.97	13.820	13.930	0.80	0.80
10/20/88	CO_2	6.020	5.470	-9.10	-9.14	13.830	13.470	-2.60	-2.60
10/20/88	CO_2	5.700	5.670	-0.50	-0.53	13.850	13.870	0.10	0.14
10/20/88	NO_x	371.000	400.000	7.80	7.82	822.000	835.000	1.10	1.58
10/20/88	SO_2	927.000	970.000	4.60	4.64	2082.000	1928.000	-7.40	-7.40
11/16/88	CO_2	6.020	6.400	6.30	6.31	13.790	14.800	7.30	7.32
11/16/88	SO_2	927.400	1033.000	11.40	11.39	2064.000	2074.000	0.50	0.48
12/21/88	SO_2	118.000	116.000	1.70	-1.69	219.000	212.000	3.20	-3.20
05/15/89	NO_x	401.000	393.000	-2.00	-2.00	896.000	906.000	1.10	1.12
05/15/89	SO_2	412.000	471.000	14.20	14.32	869.000	818.000	-5.90	-5.87
05/15/89	SO_2	6.300	6.300	0.00	0.00	14.110	14.000	-0.80	-0.78
05/25/89	CO_2	5.930	6.700	13.00	12.98	13.620	13.800	1.30	1.32
05/25/89	CO_2	5.930	6.000	1.20	1.18	13.620	14.000	2.80	2.79
05/25/89	SO_2	919.000	965.000	5.00	5.01	2021.000	2205.000	9.10	9.10
05/25/89	SO_2	919.000	923.000	0.40	0.44	2021.000	2055.000	1.70	1.68
** Unit Code - 5IN02.2									
05/16/89	CO_2	6.300	6.300	0.00	0.00	13.800	13.600	-1.40	-1.45
05/16/89	SO_2	413.000	460.000	11.40	11.38	929.600	834.000	-10.30	-10.28
05/16/89	SO_2	413.000	460.000	11.40	11.38	929.600	834.000	-10.30	-10.28
** Unit Code - 5MI03.1									
02/27/88	NO_x	543.180	564.450	3.92	3.92	197.080	176.850	10.26	-10.26
02/28/88	SO_2	546.000	505.190	7.47	-7.47	199.400	210.320	5.48	5.48
12/29/88	O_2	9.290	9.090	2.19	-2.15	5.190	5.160	0.58	-0.58

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 5MN06.1									
03/29/88	CO_2	6.100	6.100	0.20	0.00	9.000	8.900	1.30	-1.11
03/29/88	NO_x	145.500	154.730	6.30	6.34	425.000	433.170	1.90	1.92
03/29/88	SO_2	146.80	154.000	4.90	4.90	425.000	414.900	2.40	-2.38
03/31/88	O_2	1.02	1.000	2.00	-1.96	20.900	21.000	0.50	0.48
03/31/88	SO_2	303.00	315.930	4.30	4.27	817.000	798.270	2.30	-2.29
06/26/88	CO_2	3.90	4.100	2.80	5.13	11.900	11.830	0.60	-0.59
06/26/88	NO_x	148.00	152.200	2.80	2.84	421.000	432.530	2.70	2.74
06/26/88	SO_2	297.00	318.870	7.40	7.36	830.000	835.970	0.70	0.72
06/26/88	SO_2	148.00	148.400	0.30	0.27	421.000	399.600	5.10	-5.08
06/27/88	O_2	4.00	3.980	1.00	-0.50	7.800	7.570	3.70	-2.95
12/26/88	O_2	1.00	1.000	0.00	0.00	5.000	5.060	1.10	1.20
12/26/88	SO_2	302.50	325.770	7.70	7.69	809.100	796.670	1.50	-1.54
12/31/88	CO_2	5.91	6.000	1.40	1.45	11.790	11.800	0.10	0.08
12/31/88	NO_x	167.00	158.630	5.00	-5.01	425.400	419.800	1.30	-1.32
12/31/88	SO_2	161.30	162.000	0.40	0.43	423.900	413.970	2.30	-2.34
04/17/89	O_2	5.010	5.200	3.70	3.79	9.980	10.300	3.20	3.21
04/17/89	SO_2	302.500	301.110	-0.50	-0.46	809.100	733.990	-9.30	-9.28
04/17/89	SO_2	161.300	168.390	4.40	4.40	423.900	423.390	-0.10	-0.12
04/18/89	CO_2	5.914	5.990	1.30	1.29	11.790	11.800	0.10	0.08
04/18/89	NO_x	167.000	163.060	-2.40	-2.36	425.400	407.720	-4.20	-4.16
** Unit Code - 6NM01.1									
09/12/88	NO_x	251.000	251.000	0.00	0.00	555.000	558.000	0.50	0.54
09/12/88	O_2	5.000	5.200	4.00	4.00	10.100	9.800	-3.00	-2.97
09/13/88	O_2	5.000	5.400	8.00	8.00	10.000	9.900	-2.00	-1.00
09/13/88	O_2	5.000	5.200	4.00	4.00	10.100	9.800	-3.00	-2.97
09/13/88	SO_2	374.000	355.000	-5.10	-5.08	827.000	735.000	-11.10	-11.12
09/13/88	SO_2	374.000	369.000	-1.30	-1.34	827.000	804.000	-2.80	-2.78
09/13/88	SO_2	126.000	133.000	5.60	5.56	276.000	276.000	0.00	0.00
12/05/88	NO_x	251.000	253.670	1.06	1.06	555.000	568.000	2.34	2.34
12/05/88	O_2	5.000	5.200	2.97	4.00	10.100	9.970	-0.30	-1.29
12/05/88	SO_2	126.000	118.330	-6.01	-6.09	276.000	263.670	-4.59	-4.47
12/06/88	O_2	5.000	5.200	2.97	4.00	10.100	9.900	-1.00	-1.98
12/06/88	O_2	5.000	5.130	1.65	2.60	10.100	9.800	-2.00	-2.97
12/06/88	SO_2	374.000	360.000	-3.85	-3.74	827.000	803.600	-2.87	-2.83
12/06/88	SO_2	374.000	362.300	-3.22	-3.13	827.000	810.000	-2.10	-2.06
03/15/89	O_2	5.000	5.000	0.67	0.00	9.800	9.500	-3.12	-3.06
03/15/89	O_2	5.000	5.000	0.67	0.00	9.800	9.500	-3.46	-3.06
03/15/89	O_2	5.000	5.000	0.67	0.00	9.800	9.500	-3.12	-3.06
03/15/89	SO_2	374.000	355.000	-5.18	-5.08	827.000	808.000	-2.34	-2.30
03/15/89	SO_2	374.000	366.000	-2.15	-2.14	827.000	807.000	-2.43	-2.42
03/16/89	NO_x	251.000	266.000	5.98	5.98	555.000	586.700	5.71	5.71
03/16/89	SO_2	126.000	130.700	3.79	3.73	276.000	267.700	-3.09	-3.01

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 6TX03.1									
06/26/88	CO_2	6.000	5.600	-6.70	-6.67	12.400	12.000	-3.20	-3.23
06/26/88	CO_2	6.000	6.600	0.00	10.00	12.400	12.500	0.80	0.81
06/27/88	CO_2	6.000	6.000	0.00	0.00	12.400	12.400	0.00	0.00
06/27/88	NO_x	248.700	252.000	1.30	1.33	549.100	554.700	1.00	1.02
06/27/88	SO_2	942.800	947.700	0.50	0.52	2575.000	2670.300	3.70	3.70
06/27/88	SO_2	942.800	947.000	0.40	0.45	2575.000	2686.700	4.30	4.34
06/27/88	SO_2	122.700	120.000	-2.20	-2.20	285.800	275.300	-3.70	-3.67
08/29/88	CO_2	6.000	6.100	1.70	1.67	12.400	12.300	-0.80	-0.81
08/29/88	CO_2	6.000	6.100	1.70	1.67	12.400	12.400	0.00	0.00
08/29/88	CO_2	6.000	6.000	0.00	0.00	12.400	12.400	0.00	0.00
08/29/88	NO_x	249.500	251.700	0.90	0.88	493.200	491.700	-0.30	-0.30
08/29/88	SO_2	950.900	959.700	0.90	0.93	2414.000	2445.000	1.30	1.28
08/29/88	SO_2	950.900	962.000	1.20	1.17	2414.000	2449.000	1.40	1.45
08/29/88	SO_2	126.300	116.700	-7.60	-7.60	301.700	285.700	-5.30	-5.30
02/22/89	CO_2	6.990	7.200	3.00	3.00	11.930	11.700	-2.00	-1.93
02/22/89	CO_2	6.990	6.300	-10.00	-9.87	11.930	10.700	-11.00	-10.31
02/22/89	NO_x	257.400	224.000	-13.00	-12.98	559.100	514.000	-8.00	-8.07
02/23/89	SO_2	1247.000	1249.000	0.00	0.16	2759.000	2766.000	0.00	0.25
02/23/89	SO_2	1247.000	1258.000	1.00	0.88	2759.000	2781.000	1.00	0.80
02/23/89	SO_2	126.400	117.000	-7.00	-7.44	278.300	254.000	-9.00	-8.73
03/22/89	CO_2	6.990	7.300	4.00	4.43	11.930	11.700	-2.00	-1.93
05/16/89	CO_2	6.990	7.400	6.00	5.87	11.930	12.500	4.00	4.78
05/16/89	NO_x	257.400	263.000	2.00	2.18	559.100	568.000	2.00	1.59
05/18/89	SO_2	1247.000	1123.000	-10.00	-9.94	2759.000	2499.000	-9.00	-9.42
05/18/89	SO_2	1247.000	1253.000	1.00	0.48	2759.000	2469.000	-11.00	-10.51
05/18/89	SO_2	126.400	129.000	2.00	2.06	278.300	275.000	-1.00	-1.19
05/24/89	CO_2	6.990	7.500	7.00	7.30	11.930	12.400	4.00	3.94

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 6TX03.2									
08/30/88	CO_2	6.000	6.000	0.00	0.00	12.400	12.400	0.00	0.00
08/30/88	CO_2	6.000	6.000	0.00	0.00	12.400	12.300	-0.50	-0.81
08/30/88	CO_2	6.000	6.000	0.00	0.00	12.400	12.300	-0.80	-0.81
08/30/88	NO_x	249.500	249.500	0.00	0.00	463.200	491.300	-0.30	6.07
08/30/88	SO_2	950.900	953.300	0.20	0.25	2414.000	2410.000	-0.20	-0.17
08/30/88	SO_2	950.900	954.700	0.40	0.40	2414.000	2411.000	-0.10	-0.12
08/30/88	SO_2	126.300	119.300	-5.50	-5.54	301.700	287.300	-4.80	-4.77
02/24/89	CO_2	6.990	6.700	-4.00	-4.15	11.930	12.000	0.00	0.59
02/24/89	CO_2	6.990	6.700	-4.00	-4.15	11.930	12.000	0.00	0.59
02/24/89	CO_2	6.990	6.800	-3.00	-2.72	11.930	11.900	-1.00	-0.25
02/24/89	NO_x	257.400	262.000	2.00	1.79	559.100	560.000	0.00	0.16
02/24/89	SO_2	1247.000	1309.000	5.00	4.97	2759.000	2812.000	2.00	1.92
02/24/89	SO_2	1247.000	1308.000	5.00	4.89	2759.000	2808.000	2.00	1.78
02/24/89	SO_2	126.400	124.000	-2.00	-1.90	278.300	269.000	-3.00	-3.34
05/16/89	SO_2	1247.000	1156.000	-7.00	-7.30	2759.000	2628.000	-5.00	-4.75
05/16/89	SO_2	1246.000	1167.000	-6.00	-6.34	2759.000	2655.000	-4.00	-3.77
05/16/89	SO_2	126.400	127.000	0.00	0.47	278.300	275.000	-1.00	-1.19
05/18/89	NO_x	257.400	267.000	4.00	3.73	559.100	582.000	4.00	4.10
05/24/89	CO_2	6.571	6.600	0.00	0.44	11.930	13.600	14.00	14.00
05/24/89	CO_2	6.571	6.700	1.00	1.96	11.930	11.900	-1.00	-0.25
05/24/89	CO_2	6.571	6.900	5.00	5.01	11.930	13.500	13.00	13.16
** Unit Code - 6TX03.3									
06/28/88	CO_2	6.000	5.300	-11.70	-11.67	12.400	12.600	1.60	1.61
06/28/88	NO_x	248.700	232.700	-6.40	-6.43	549.100	505.800	-7.90	-7.89
06/28/88	SO_2	285.800	272.000	-4.80	-4.83	942.800	945.900	0.30	0.33
06/28/88	SO_2	122.700	126.200	2.90	2.85	285.800	274.000	-4.10	-4.13
08/31/88	CO_2	6.000	5.800	4.40	-3.33	12.400	12.600	1.60	1.61
08/31/88	CO_2	6.000	5.800	-3.90	-3.33	12.400	12.600	1.90	1.61
08/31/88	SO_2	301.700	285.300	-5.40	-5.44	950.900	952.700	0.20	0.19
08/31/88	SO_2	126.300	122.500	-3.00	-3.01	301.700	291.100	-3.50	-3.51
03/08/89	CO_2	6.760	6.570	2.80	-2.81	12.280	11.930	2.90	-2.85
03/08/89	CO_2	6.830	6.570	4.00	-3.81	12.170	11.930	2.00	-1.97
03/08/89	NO_x	259.970	257.400	1.00	-0.99	522.060	557.600	-6.40	6.81
03/08/89	SO_2	131.410	126.600	3.80	-3.66	268.520	275.900	-2.70	2.75
03/08/89	SO_2	396.700	375.100	5.80	-5.44	847.110	834.200	1.50	-1.52
06/22/89	CO_2	7.260	6.570	10.50	-9.50	12.200	11.930	2.30	-2.21
06/22/89	CO_2	7.240	6.570	10.20	-9.25	12.220	11.930	2.50	-2.37
06/22/89	NO_x	240.660	257.400	-6.50	6.96	535.150	557.600	-4.00	4.20
06/22/89	SO_2	379.830	375.100	1.30	-1.25	850.950	834.200	2.00	-1.97
06/22/89	SO_2	124.260	126.600	-1.80	1.88	276.500	275.900	0.20	-0.22

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 6TX04.1									
12/29/88	CO	125.700	140.710	11.94	11.94	277.300	284.690	2.66	2.66
12/29/88	NO_x	238.000	247.150	3.84	3.84	520.100	531.350	2.16	2.16
12/29/88	O_2	5.025	5.023	-0.04	-0.04	10.060	10.080	0.20	0.20
12/29/88	O_2	5.075	5.083	0.15	0.16	10.040	10.080	0.40	0.40
12/29/88	SO_2	250.200	252.270	0.83	0.83	551.800	544.300	-1.36	-1.36
12/29/88	SO_2	249.900	267.000	6.84	6.84	553.500	576.600	4.17	4.17
03/22/89	CO	125.700	136.919	8.93	8.93	277.300	271.481	-2.10	-2.10
03/22/89	NO_x	238.000	247.889	4.16	4.16	520.100	531.804	2.25	2.25
03/22/89	O_2	5.025	4.754	-5.39	-5.39	10.060	9.906	-1.53	-1.53
03/22/89	O_2	5.075	5.143	1.34	1.34	10.040	10.123	0.83	0.83
03/22/89	SO_2	250.200	249.407	0.32	-0.32	551.800	553.201	0.25	0.25
03/22/89	SO_2	249.900	254.300	1.76	1.76	553.500	545.000	1.54	-1.54
** Unit Code - 7IA01.1									
03/30/88	NO_x	248.000	240.200	-3.10	-3.15	565.000	558.100	-1.20	-1.22
03/30/88	O_2	5.380	5.100	-5.20	-5.20	10.100	10.100	0.00	0.00
03/30/88	O_2	5.170	4.900	-5.20	-5.22	10.200	10.500	2.90	2.94
03/30/88	SO_2	990.000	1096.700	10.80	10.78	1966.000	2158.600	9.80	9.80
03/30/88	SO_2	141.000	146.700	4.00	4.04	260.000	265.900	2.30	2.27
09/23/88	NO_x	257.500	261.070	1.39	1.39	568.100	574.230	1.08	1.08
09/23/88	O_2	5.170	5.100	-0.07	-1.35	10.200	10.000	0.20	-1.96
09/23/88	SO_2	996.800	1032.400	3.57	3.57	2185.000	2237.400	2.40	2.40
11/28/88	NO_x	257.500	283.900	10.27	10.25	568.100	623.600	9.77	9.77
11/28/88	O_2	5.170	5.300	0.13	2.51	10.200	10.200	0.00	0.00
11/28/88	SO_2	996.800	979.300	-1.76	-1.76	2185.000	2110.130	-3.43	-3.43
02/27/89	NO_x	257.500	254.330	-1.23	-1.23	568.100	559.770	-1.47	-1.47
02/27/89	O_2	5.170	5.000	-0.17	-3.29	10.200	10.100	-0.10	-0.98
02/27/89	SO_2	996.800	1012.730	1.60	1.60	2185.000	2187.000	0.09	0.09

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 7KS02.1									
05/17/88	CO	124.500	117.330	-5.76	-5.76	276.500	266.330	-3.68	-3.68
05/17/88	NO_x	252.910	256.030	1.23	1.23	562.200	567.660	0.97	0.97
05/17/88	O_2	5.020	5.110	1.83	1.79	8.960	9.150	2.11	2.12
05/17/88	O_2	5.020	5.120	2.02	1.99	8.960	9.540	6.37	6.47
05/17/88	SO_2	200.300	183.930	-8.17	-8.17	400.500	409.720	2.30	2.30
05/17/88	SO_2	61.450	61.970	0.85	0.85	136.900	139.060	1.58	1.58
06/08/88	SO_2	91.010	93.940	3.22	3.22	200.300	214.770	7.22	7.22
09/07/88	O_2	5.020	4.830	-3.65	-3.78	8.960	8.660	-3.34	-3.35
09/07/88	SO_2	200.300	191.260	-4.51	-4.51	400.500	384.220	-4.06	-4.06
09/07/88	SO_2	91.010	81.800	-10.12	-10.12	200.300	184.230	-8.02	-8.02
09/07/88	SO_2	91.010	89.050	-2.16	-2.15	200.030	207.430	3.56	3.70
09/07/88	SO_2	61.450	63.550	3.41	3.42	136.900	132.710	-3.06	-3.06
09/21/88	CO	124.500	122.820	-1.35	-1.35	276.500	282.100	2.03	2.03
09/21/88	NO_x	252.910	256.820	1.54	1.55	562.200	574.170	2.13	2.13
09/21/88	O_2	5.020	5.170	3.14	2.99	8.960	9.540	6.43	6.47
03/15/89	CO	124.500	116.410	-6.50	-6.50	276.500	256.860	-7.10	-7.10
03/15/89	NO_x	252.910	257.040	1.63	1.63	562.200	564.000	0.32	0.32
03/15/89	O_2	5.020	5.190	3.44	3.39	8.960	9.430	5.98	5.25
03/15/89	SO_2	61.450	65.180	6.06	6.07	136.900	131.640	-3.84	-3.84
03/16/89	O_2	5.020	4.720	-6.00	-5.98	8.960	8.290	-7.56	-7.48
03/16/89	SO_2	200.300	187.900	-6.19	-6.13	400.500	382.240	-4.56	-4.56
03/16/89	SO_2	91.010	85.280	-6.30	-6.30	200.300	196.030	-2.13	-2.13
03/23/89	SO_2	91.010	87.860	-3.46	-3.46	200.300	198.370	-0.97	-0.96
** Unit Code - 8C001.1A									
05/17/88	CO_2	6.800	6.700	1.50	-1.47	10.000	10.500	4.80	5.00
05/17/88	CO_2	6.800	6.600	2.50	-2.94	10.000	10.300	2.90	3.00
05/17/88	CO_2	6.900	6.800	1.50	-1.45	10.000	10.700	6.50	7.00
05/17/88	NO_x	274.800	285.300	3.70	3.82	512.100	519.100	1.30	1.37
05/17/88	SO_2	247.300	232.700	6.30	-5.90	543.900	529.000	2.80	-2.74
05/17/88	SO_2	247.300	253.700	2.50	2.59	543.900	567.300	4.10	4.30
05/17/88	SO_2	50.400	52.600	4.20	4.37	125.500	132.500	5.20	5.58
11/09/88	CO_2	6.870	6.760	-1.04	-1.60	10.000	10.730	-5.83	7.30
11/09/88	CO_2	6.870	6.810	0.83	-0.87	10.000	10.650	-6.10	6.50
11/09/88	CO_2	6.870	7.090	-3.06	3.20	10.000	10.770	-7.18	7.70
11/09/88	NO_x	261.700	260.570	0.43	-0.43	512.800	511.440	0.27	-0.27
11/09/88	SO_2	252.400	252.810	-0.16	0.16	583.300	584.260	-0.59	0.16
11/09/88	SO_2	252.400	254.150	-0.69	0.69	583.300	609.480	-4.30	4.49
11/09/88	SO_2	63.260	70.560	-10.35	11.54	133.500	142.830	-6.53	6.99
03/22/89	CO_2	5.530	5.860	-5.94	5.97	11.200	11.450	-5.26	2.23
03/22/89	CO_2	5.530	5.350	3.25	-3.25	11.200	11.160	0.33	-0.36
03/22/89	SO_2	283.800	277.220	-2.18	-2.32	557.000	547.640	-0.18	-1.68
03/22/89	SO_2	283.800	281.740	0.73	-0.73	557.000	561.150	-0.74	0.75
03/23/89	CO_2	5.530	5.800	-4.85	4.88	11.200	11.220	-0.13	0.18
03/23/89	NO_x	274.800	284.500	-3.53	3.53	486.500	492.590	-1.25	1.25
03/23/89	SO_2	53.750	55.120	-2.54	2.55	141.200	150.760	-6.77	6.77

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 8C001.2									
09/26/88	CO_2	6.000	5.460	9.85	-9.00	12.000	11.590	3.56	-3.42
09/26/88	NO_x	255.000	237.390	7.42	-6.91	561.000	534.790	4.90	-4.67
09/26/88	SO_2	123.200	121.410	1.47	-1.45	240.000	261.040	-8.06	8.77
11/17/88	CO_2	6.000	5.370	11.73	-10.50	12.000	11.340	5.82	-5.50
11/17/88	NO_x	255.000	236.100	8.00	-7.41	561.000	532.310	5.39	-5.11
11/17/88	SO_2	123.200	122.950	0.23	-0.20	240.000	263.860	-9.04	9.94
03/06/89	CO_2	6.037	5.190	16.30	-14.03	12.020	11.220	7.10	-6.66
03/06/89	CO_2	6.037	5.190	16.30	-14.03	12.020	11.220	7.10	-6.66
03/06/89	NO_x	249.300	246.550	1.10	-1.10	556.600	567.280	-0.10	1.92
03/06/89	SO_2	125.000	133.220	-6.20	6.58	238.100	256.430	-7.10	7.70
** Unit Code - 8C002.1									
03/09/88	CO_2	6.450	5.970	-7.44	-7.44	14.940	14.500	-2.95	-2.95
03/09/88	SO_2	70.400	77.300	9.80	9.80	152.700	150.730	-1.90	-1.29
03/11/88	CO_2	6.450	6.230	-3.41	-3.41	14.940	14.800	-0.94	-0.94
03/11/88	CO_2	6.450	6.230	-3.41	-3.41	14.940	14.800	-0.94	-0.94
03/11/88	NO_x	69.800	68.230	-2.25	-2.25	237.000	235.270	-0.73	-0.73
03/11/88	SO_2	70.400	68.800	-2.27	-2.27	199.500	191.300	-4.11	-4.11
06/10/88	CO_2	6.450	6.630	2.79	2.79	11.550	11.990	3.81	3.81
06/10/88	CO_2	6.450	6.250	-3.10	-3.10	14.940	14.820	-0.80	-0.80
06/10/88	NO_x	69.800	71.060	1.81	1.81	237.000	240.820	3.82	1.61
06/10/88	SO_2	70.400	77.980	7.58	10.77	311.000	317.600	6.60	2.12
06/10/88	SO_2	70.400	71.090	0.98	0.98	199.500	194.470	-2.52	-2.52
09/12/88	CO_2	6.070	6.170	1.65	1.65	15.350	15.990	4.17	4.17
09/12/88	CO_2	6.060	5.990	-1.16	-1.16	15.540	15.780	1.54	1.54
09/12/88	NO_x	75.900	79.630	4.91	4.91	231.300	231.220	-0.03	-0.03
09/12/88	SO_2	125.900	132.890	5.55	5.55	422.000	430.000	1.90	1.90
09/12/88	SO_2	69.300	69.700	0.58	0.58	240.900	234.540	-2.64	-2.64
12/12/88	CO	126.300	111.380	11.81	-11.81	423.000	400.380	-5.35	-5.35
12/12/88	CO_2	6.000	6.000	-0.07	0.00	15.350	15.590	1.56	1.56
12/12/88	CO_2	5.860	5.860	-0.20	0.00	15.540	15.470	-0.45	-0.45
12/12/88	NO_x	75.900	78.770	3.78	3.78	231.300	231.490	0.08	0.08
12/12/88	SO_2	125.900	133.480	6.02	6.02	422.000	427.620	1.33	1.33
12/12/88	SO_2	69.300	68.820	-0.69	-0.69	240.900	235.990	-2.04	-2.04
03/07/89	CO	126.000	136.130	8.04	8.04	422.000	417.320	1.11	-1.11
03/07/89	CO_2	6.060	5.900	-2.64	-2.64	15.360	15.410	0.33	0.33
03/07/89	CO_2	6.050	5.710	-5.62	-5.62	15.540	15.310	-1.48	-1.48
03/07/89	NO_x	76.000	77.090	1.43	1.43	231.700	236.100	1.90	1.90
03/07/89	SO_2	125.400	125.700	0.24	0.24	423.000	412.010	-2.60	-2.60
03/07/89	SO_2	69.000	72.700	5.36	5.36	240.500	238.960	-0.64	-0.64
** Unit Code - 8ND03.1									
05/20/88	NO_x	260.400	270.300	3.80	3.80	543.750	572.300	5.25	5.25
05/20/88	O_2	4.975	5.000	0.50	0.50	10.010	9.960	-0.50	-0.50
05/20/88	SO_2	346.000	378.300	9.15	9.15	796.590	804.300	0.97	0.97
12/01/88	NO_x	260.400	265.000	1.80	1.77	543.750	567.000	4.30	4.28
12/01/88	O_2	4.975	5.030	1.10	1.11	10.010	10.430	4.20	4.20
12/01/88	SO_2	347.000	346.700	0.08	-0.09	794.000	734.600	7.40	-7.48
03/17/89	NO_x	260.400	257.700	1.00	-1.04	563.900	545.000	3.40	-3.35
03/17/89	O_2	4.975	5.000	0.50	0.50	10.010	10.200	1.90	1.90
03/17/89	SO_2	345.400	350.000	1.40	1.33	794.000	784.300	1.20	-1.22

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 8UT04.1									
02/11/88	NO_x	258.000	268.000	3.90	3.88	566.000	597.000	5.50	5.48
02/11/88	O_2	5.000	4.800	-4.00	-4.00	9.600	9.500	-1.00	-1.04
02/11/88	SO_2	35.000	31.300	-10.60	-10.57	76.000	74.000	-2.60	-2.63
09/08/88	NO_x	258.000	241.000	-6.60	-6.59	566.000	590.000	4.20	4.24
09/08/88	O_2	5.000	5.700	14.00	14.00	9.600	10.500	9.40	9.38
09/08/88	SO_2	35.000	27.100	-22.60	-22.57	76.000	69.800	-8.20	-8.16
12/11/88	NO_x	258.000	233.000	-9.70	-9.69	566.000	588.000	3.90	3.89
12/11/88	O_2	5.000	4.900	-2.00	-2.00	10.000	9.200	-8.00	-8.00
12/11/88	SO_2	39.000	36.000	-7.70	-7.69	80.300	73.900	-8.00	-7.97
03/16/89	NO_x	258.000	222.000	-14.00	-13.95	566.000	583.000	3.00	3.00
03/16/89	O_2	5.000	5.200	4.00	4.00	9.600	9.500	-1.40	-1.04
03/16/89	SO_2	76.000	72.400	-4.70	-4.74	828.500	849.000	2.50	2.47
** Unit Code - 8UT05.1									
09/23/88	NO_x	226.600	225.000	-0.70	-0.71	547.000	538.000	-1.60	-1.65
09/23/88	O_2	5.130	5.300	3.30	3.31	10.230	9.900	-3.20	-3.23
09/23/88	SO_2	30.600	32.000	4.60	4.58	284.200	283.000	-0.40	-0.42
09/26/88	NO_x	226.600	227.000	0.20	0.18	547.000	539.000	-1.50	-1.46
09/26/88	O_2	5.130	5.000	-2.50	-2.53	10.230	10.300	-0.70	0.68
09/26/88	SO_2	125.900	133.000	5.60	5.64	284.200	285.000	0.30	0.28
12/23/88	O_2	5.130	5.130	0.00	0.00	10.230	10.300	0.70	0.68
12/23/88	SO_2	30.600	29.000	-5.20	-5.23	284.200	297.300	4.60	4.61
12/29/88	NO_x	226.600	224.700	-0.80	-0.84	547.000	537.000	-1.80	-1.83
12/29/88	O_2	5.130	5.130	0.00	0.00	10.230	10.470	2.40	2.35
12/29/88	SO_2	125.900	123.300	-2.10	-2.07	284.200	279.300	-1.70	-1.72
** Unit Code - 8UT05.2									
03/14/88	NO_x	263.000	267.000	1.50	1.52	578.000	571.000	-1.20	-1.21
03/14/88	O_2	5.360	5.400	0.80	0.75	10.240	10.100	-1.40	-1.37
03/14/88	SO_2	29.500	32.000	8.50	8.47	271.000	290.000	7.00	7.01
09/23/88	NO_x	226.600	226.000	-0.30	-0.26	547.000	552.000	0.90	0.91
09/23/88	O_2	5.130	5.300	3.30	3.31	10.230	10.200	-0.30	-0.29
09/23/88	O_2	5.130	5.200	1.40	1.36	10.230	10.100	-1.30	-1.27
09/23/88	SO_2	125.900	128.000	1.70	1.67	284.200	293.000	3.10	3.10
09/23/88	SO_2	30.600	30.300	-1.00	-0.98	284.200	283.000	-0.40	-0.42
09/26/88	NO_x	226.600	225.000	-0.70	-0.71	547.000	539.000	-1.50	-1.46
12/23/88	NO_x	226.600	226.300	-0.10	-0.13	547.000	542.000	-0.90	-0.91
12/23/88	O_2	5.130	5.200	1.40	1.36	10.230	10.100	-1.30	-1.27
12/23/88	O_2	5.130	5.200	1.40	1.36	10.230	10.100	-1.30	-1.27
12/23/88	SO_2	125.900	127.000	0.90	0.87	284.200	280.300	-1.40	-1.37
12/23/88	SO_2	30.600	30.000	-2.00	-1.96	284.200	298.300	5.00	4.96
03/09/89	NO_x	203.500	201.000	-1.20	-1.23	526.000	525.000	-0.20	-0.19
03/09/89	O_2	5.130	5.300	3.30	3.31	10.230	10.130	-1.00	-0.98
03/09/89	SO_2	30.600	31.000	1.30	1.31	265.600	282.700	6.40	6.44
03/10/89	NO_x	203.500	198.300	-2.60	-2.56	526.000	514.000	-2.30	-2.28
03/10/89	O_2	5.130	5.300	3.30	3.31	10.230	10.070	-1.60	-1.56
03/10/89	SO_2	265.600	260.000	-2.10	-2.11	553.000	550.000	-0.50	-0.54

		1st Audit Point				2nd Audit Point			
Date	Gas	RM	CEMS	Reported RA	Recalculated RA	RM	CEMS	Reported RA	Recalculated RA
** Unit Code - 9CA01.1									
01/07/89	CO_2	6.130	6.230	1.63	1.63	11.570	11.520	-0.43	-0.43
01/07/89	NO_x	14.290	12.990	-9.10	-9.10	30.300	29.470	-2.74	-2.74
01/07/89	SO_2	23.540	22.330	-5.14	-5.14	52.300	48.820	-6.65	-6.65
03/15/89	CO_2	6.130	6.400	4.40	4.40	11.570	11.430	-1.21	-1.21
03/15/89	NO_x	14.290	12.830	-10.22	-10.22	30.300	28.170	-7.03	-7.03
03/15/89	SO_2	23.540	25.770	9.47	9.47	52.300	52.720	0.80	0.80
07/19/89	CO_2	6.100	6.330	3.77	3.77	15.900	15.590	-1.94	-1.95
07/19/89	NO_x	33.000	30.830	-6.57	-6.58	33.000	29.780	-9.75	-9.76
07/19/89	SO_2	51.000	49.300	-2.33	-3.33	51.000	49.780	-2.39	-2.39
** Unit Code - 9NV03.1									
09/22/88	NO_x	250.610	252.600	1.00	0.79	551.610	539.000	-2.30	-2.29
09/22/88	O_2	5.010	5.700	13.70	13.77	9.960	9.800	-1.60	-1.61
09/22/88	SO_2	99.490	97.000	-2.50	-2.50	257.130	251.000	-4.30	-2.38
12/13/88	NO_x	250.610	253.000	0.90	0.95	551.610	542.600	-1.74	-1.63
12/13/88	O_2	5.010	5.100	1.80	1.80	99.600	99.000	0.60	-0.60
12/13/88	SO_2	99.490	99.200	0.30	-0.29	224.700	231.500	3.03	3.03
03/28/89	NO_x	250.610	258.300	3.10	3.07	551.610	527.300	-2.60	-4.41
03/28/89	O_2	5.010	5.400	7.80	7.78	9.600	10.400	8.30	8.33
03/28/89	SO_2	99.490	92.000	-7.10	-7.53	257.130	243.000	-5.50	-5.50
** Unit Code - 9NV04.1									
06/29/88	O_2	4.090	3.880	5.10	-5.13	20.900	21.650	3.50	3.59
06/29/88	SO_2	73.800	71.600	3.00	-2.98	294.500	294.000	0.00	-0.17
07/21/88	O_2	4.090	4.390	6.80	7.33	20.900	22.300	6.30	6.70
07/21/88	SO_2	73.800	69.900	5.30	-5.28	294.000	308.100	4.60	4.80
09/21/88	NO_x	76.400	79.400	3.80	3.93	291.300	296.200	1.70	1.68
09/22/88	NO_x	150.500	146.340	3.00	-2.76	408.000	374.540	8.00	-8.20
09/22/88	O_2	5.340	5.360	0.00	0.37	9.320	9.330	0.00	0.11
09/22/88	O_2	5.340	5.120	4.00	-4.12	9.320	9.130	2.00	-2.04
09/22/88	SO_2	152.100	155.800	2.00	2.43	363.000	369.000	2.00	1.65
09/22/88	SO_2	152.100	159.770	5.00	5.04	363.000	370.700	2.00	2.12
04/12/89	NO_x	151.100	155.200	2.60	2.71	408.000	405.000	0.70	-0.74
04/12/89	O_2	5.340	5.280	1.10	-1.12	9.320	9.160	1.70	-1.72
04/12/89	O_2	5.340	5.380	0.70	0.75	9.320	9.230	1.20	-0.97
04/12/89	SO_2	153.200	151.100	1.40	-1.37	363.000	368.000	1.40	1.38
04/12/89	SO_2	153.200	159.500	3.90	4.11	363.000	385.000	5.70	6.06

Relative Accuracy Audit Data

Date	Gas	Method	Relative Mean	CEMS Mean	Relative Accuracy
** Unit Code - 4KY05.1					
06/01/88	SO_2	6C	7.1050	7.5340	6.00
06/07/88	SO_2	6C	7.0760	6.8060	-4.00
06/20/88	NO_x	7E	0.3880	0.3760	-3.00
06/20/88	SO_2	6C	0.5470	0.5400	-1.00
08/23/88	SO_2	6C	6.8330	7.5130	10.00
08/24/88	SO_2	6C	6.7730	7.2930	8.00
08/29/88	NO_x	7E	0.5390	0.5670	5.00
08/29/88	SO_2	6C	0.6150	0.5840	-5.00
** Unit Code - 4SC06.1					
06/15/88	NO_x	7	1.7880	1.8553	3.80
03/15/89	NO_x	7	0.3320	0.3831	15.39
03/15/89	SO_2	6	0.0000	0.6700	0.00